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AMERICAN PHARMACEUTICAL ASSOCIATION

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THE SIXTY-NINTH ANNUAL CONVENTION OF THE AMERICAN PHARMACEUTICAL ASSOCIATION WILL BE HELD IN NEW ORLEANS, LA., SEPTEMBER, 1921

The 1921 meetings of the American Conference of Pharmaceutical Faculties and the National Association of Boards of Pharmacy will also be held in New Orleans during Convention Week

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PROFESSOR DR. ARTHUR MEYER

Honorary Member of the American Pharmaceutical Association

ARTHUR MEYER

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

VOL. IX SEPTEMBER 1920 NO. 9

ARTHUR MEYER.

Professor Dr. Arthur Meyer passed his "three score and ten" March 17 of this year. He was born in Langensalza, Germany, and received his earlier school education in Sondershausen. At the age of 17 years he was apprenticed with an apothecary of Nordhausen. After completing his apprenticeship he studied at the Universities of Strassburg and of Leipzig. During the term of 1879–80, he successfully passed the State pharmaceutical examination and, on recommendation of Professor Flückiger, was appointed assistant at the Strassburg Institute of Pharmacy. Shortly before his promotion he published his first contribution to pharmacognosy—"Vegetable Wax."

However, it was under de Bary that the foundations for Dr. Meyer's future scientific achievements were laid. Under the inspiring influence of the famed teacher and in the fellowship of Stahl, Büsgen and other well-known botanists, who were contemporary students under de Bary, he ardently pursued his studies for three years. Here and then developed his deep interest in plant anatomy and physiology, so brilliantly manifested in later publications.

He received his doctorate degree of the University of Strassburg in 1883, from the faculty of natural sciences. In 1885 he became instructor in botany at the University of Göttingen, and in the following year accepted the professorship of pharmacognosy and pharmaceutical chemistry at Münster, where he remained for five years, resigning to accept the call of the University of Marburg. With the latter institution he has been connected for nearly thirty years as professor of botany and pharmacognosy, and he is also director of the botanical gardens.

Professor Meyer's scientific contributions are numerous and cover a wide range of subjects in pharmacy, microscopy, botany, pharmacognosy, mycology, etc. He is the author of a number of valuable works, and references to them are given in a special edition of the *Apotheker-Zeitung*, No. 11, 1920, issued in commemoration of his seventieth birthday.

"The Cell of Bacteria" is a well-known work. Age has not abated his scientific activities. Only a few months ago he published the first volume of a comprehensive work entitled, "Morphological and Physiological Analysis of the Plant and Animal Cell. The Principles of Our Knowledge of Cell Structure and its Relation to the Function of the Cell." Doctor Meyer was elected an honorary member of the American Pharmaceutical Association in 1910.

JOSEPH ROSIN.

EDITORIAL

E. G. EBERLE, Editor 253 Bourse Bldg., PHILADELPHIA

GENERAL PRINCIPLES TO BE FOLLOWED IN REVISING THE NATIONAL FORMULARY.

AT the recent meeting of the National Formulary Committee a considerable portion of the time was spent in considering the fundamental principles to be followed in this revision.

The Formulary needs to occupy a place of leadership in pharmacy, and to do this it must not follow usage in all respects, but must have a purpose of its own beyond that of simply perpetuating desirable formulas. This means some change in policy, and it is the desire of the present committee that this policy shall be sound and lasting. If it proves so, the Formulary will establish an enduring place for itself in pharmacy which cannot be occupied by any other book. If the readers of this JOURNAL see any weakness in the policy which the committee has adopted, they will do a kindness to pharmacy to point out such errors before the policy shall have become established. For while the following rules have been formally adopted, they can be changed, at any time, by the same body that adopted them:

1. "*Scope and Purpose of the National Formulary.*—The purpose of the National Formulary is to supply definite formulas for preparations sufficiently used in medical practice throughout the United States and its possessions, for which formulas are not included in the United States Pharmacopoeia; to provide standards and tests for the identity, quality and purity of the essential ingredients used in these formulas, which are not standardized by the Pharmacopoeia, so that uniformity in physical properties and action of constituents will be assured."

The intent of this paragraph is plain. It recognizes the precedence of the Pharmacopoeia and establishes the scope of the Formulary.

2. "*Admissions.*—Any formula in sufficient use may be admitted into the National Formulary, but no proprietary or trade-mark name shall be applied thereto, nor shall it be the aim of the Formulary to supply imitations of such proprietary or trade-marked article."

This is essentially the position of the Pharmacopoeia regarding proprietary articles. And it establishes the policy of the National Formulary as regards imitations, particularly in regard to physical characteristics of the preparations. That is, when a preparation is designedly colored to make it distinctive, the color is not to be imitated by the Formulary just because it has been adopted by the proprietors.

In the matter of imitation it is necessary to consider whether the preparation would be acceptable if uncolored, and whether the color used is original in conception or is commonly employed for liquids of that character. Also whether the flavor follows general lines or is individualistic. For instance, red is a very common color in elixirs, and orange, in modified character, is a very common flavor. To color a liquid red may not be a matter of imitation, nor to flavor it predominantly with orange, though the suggesting preparation may be red in

color and flavored with orange. Thus this principle may call for interpretation as to its real meaning in individual cases, but it shall be the aim of the Formulary to avoid direct imitations of commercial preparations.

3. "*Construction of Formulas.*—Formulas shall be listed in alphabetical sequence, and whenever possible general formulas for classes may be adopted; the metric weights and measures only are to be used."

4. "*Arrangement of Subject Matter.*—The National Formulary shall be arranged in three parts. All formulas shall be in Part I, standards for non-pharmacopœial ingredients to constitute Part II, and special tests, reagents and reference tables to be in Part III."

This continues the present general arrangement of the book. The division into parts I and II has received some criticism, but it emphasizes the fact that the book is primarily a formulary and that Part II is simply to supply needed standards on which some of the formulas are based. Already the demand has come that certain simples which are not in the Pharmacopoeia nor included in the formulas of the National Formulary shall be recognized, but to do that would invariably lead to confusion regarding the scope of the National Formulary and be very liable to lead to conflicts with the scope or standards of the Pharmacopoeia. The recognition of non-formulary simples is a tacit endorsement of therapeutic value, and that the Formulary seeks to evade.

5. "*To Accept Pharmacopoeial Principles.*—The principles adopted by the U. S. Pharmacopoeial Convention to be followed in revising the Pharmacopoeia, relating to nomenclature, changes in titles, synonyms, abbreviations, purity, rubric, international standards, physical constants, standard temperature, pharmacognostic descriptions, powdered drugs, solubilities and doses, shall be followed in the revision of the National Formulary."

This not only insures unity with the Pharmacopoeia in style and general principles, but it recognizes the precedence of the Pharmacopoeia and insures against discrepancies and contradictory standards. There should be but one fundamental principle in standardizing drugs and preparations, and the two works are thus in agreement thereto.

6. "*Therapeutic Responsibility.*—The National Formulary does not assume any responsibility for the therapeutic value of any preparation."

Here is where the National Formulary differs from the U. S. P. And it is also why the N. F. should avoid recognizing any drugs or chemicals except for the purpose of standardizing formulas. The National Formulary places the responsibility of deciding therapeutic value upon the general medical practitioner, regardless of what school or branch of medicine he may favor, and in recognition of the physician's right to employ as a remedy any preparation which he may desire. The recognition of preparations in the Formulary is based upon what the physicians desire to use. But the N. F. must recognize therapeutics to the extent of eliminating incompatibilities that may be dangerous or unscientific.

7. "*Assay Processes.*—Assay processes for as many of the potent drugs and preparations made therefrom as may be found practicable, shall be introduced into the National Formulary."

This is simply in the interest of definite standards. The assay process should, of course, be indicative of the therapeutic action of the drug, again recognizing, to some extent, a therapeutic responsibility.

8. "*Alcoholic Percentage.*—It is recommended that whenever practicable, the range of the content of absolute alcohol by volume be stated in the Formulary, accompanying the text for each preparation containing alcohol."

So long as the law requires the statement of alcoholic strength on the label, this form of help to the pharmacist is desirable. The range is intended to allow of reasonable variations when the preparation is made in accordance with the formula and with proper care.

9. "*Alcohol in Formulary Preparations.*—The proportion of alcohol entering into each formula in the National Formulary shall be carefully studied, and fixed at the minimum amount necessary for the therapeutic activity, solution, permanency or preservation of the preparation."

This is in accordance with the demand of the day—to reduce or eliminate alcohol, in so far as possible. But the Committee will not be governed simply by solubility questions. Often alcohol is needed for maintaining activity in much larger proportions than may be required for solubility or to prevent fermentative changes or bacterial growths. No reduction of alcohol will be made unless the Committee is satisfied that the preparation will suffer no loss in medicinal value thereby.

10. "*Modified Dose Statement.*—There shall be appended to each dose-statement the amount of active ingredient in the dose given."

This will be a convenience both to pharmacists and physicians. One will need only to consult the dose statement to learn not only the dose of the preparation but also the amount of active medicinal agents in the dose given. For instance, Elixir of Iron, Quinine and Strychnine will have its dose stated, then the amount of iron, of quinine, and of strychnine in the dose.

11. "*Enumeration of National Formulary Preparations in which Official Substances are Used.*—It is recommended that there be appended after each article in the text a list of National Formulary preparations in which it is an active essential ingredient, and that there be also given a list of U. S. P. substances used as active ingredients and the National Formulary preparations into which they enter."

This means that physicians and pharmacists will have available a complete list of official preparations of any particular substance. Heretofore the Pharmacopoeia has had a list and the National Formulary none. Now the Formulary will have a list to include the preparation of U. S. P. articles, so that the physician can tell at once what preparations are available containing any particular active drug, either alone or in combination.

12. "*Publicity.*—The National Formulary Committee shall publish from time to time abstracts of important changes or proposed new monographs and invite comment and suggestion before final adoption."

The Committee desires all the help that pharmacists will give in making the book useful and satisfactory. The more open its work the better should be the results, for "in a multitude of councillors there is wisdom." Here is the place for readers to begin. Speak out your comments and suggestions on these principles, and let us improve them. And it is not necessary to wait for other questions to come up. Suggest now!

13. "*Date of Adoption.*—The National Formulary Committee shall establish a definite date when the Fifth Edition of the National Formulary shall go into

effect, and the Committee will publish this date as far ahead as circumstances will permit."

These are the thirteen points which the Committee adopted in conference. We hope that thirteen will prove to be more lucky and effectual than would fourteen, but another will be added if it is needed.

W. L. SCOVILLE.

THE SPIRIT OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

THE vital force behind any institution, or organization, such as the American Pharmaceutical Association, is the spirit of solidarity—a shoulder to shoulder standing together, backing up the institution in all lines of its endeavor. It is at least one of the important vital forces.

The main endeavor or purpose of the American Pharmaceutical Association, in the three score and ten years of its existence, has not required re-formulation or revision, being now, as always, broadly expressed, the advancement of pharmacy in all of its branches—scientific, educational and commercial. This aim has attracted and evoked the interest of the best talent of our profession, drawn to the organization eminent pharmacists, in great numbers, whose lofty aim has contributed much toward the progress to which pharmacy is now heir. These Nestors of pharmacy, whose names we hold sacred, served intelligently and effectively in shaping the policy and in uniting the hands of the toilers in the common purpose. To-day, in the year 1920, the policy and ideal of the membership, as a whole, is the same as that of 1852, namely, that of uplifting our chosen vocation. To this end we speak, act and serve together.

It is a matter of congratulation that in recent years the organization has grown rapidly. Council reports contain, at frequent intervals, a list of new names, showing a constant influx of new blood, which indicates a wholesome forward movement. The animation and enthusiasm of the vigorous red fluid is highly prized. It is important, however, that much of the new element shall be properly "converted," so to speak—converted into the ideal for which the Association has always stood. This is important not only for the good of the Association but also for the good of the initiated.

It is also gratifying that there is in the Association an ardent desire for what may be termed material progress resulting from, or brought about by, federation and coöperation with different branches of our vocation. The Association needs for this the innate zeal of the newer element. Once accomplished, the "solidarity and force" of the Association will certainly be more pronounced—on the material side, at least.

A word of caution, however, seems to be in place in this connection. A word of caution from the standpoint of a conservative—from one who is jealous about the so-called ethical side, or quality, of the Association, the most important quality—the "*spirit*" of the Association. A conservative will not lose sight of this. In the material progress which the Association is seeking we should conserve that element for which the Association has stood for almost three-quarters of a century. Ethical progress should keep pace with the material.

Just a final word, or suggestion, from the Conservative's standpoint: There seems to be a natural dislike, on the part of some initiates, to conservatism. No fault can be found with this temperament. But conservatism is often attacked in the wrong way—by attacking the conservative rather than the policy. Let us substitute a progressive policy for a conservative, if it is best so to do, but let it be done without attacking the individual who advocates the latter policy. Let the progressive pursue his campaign so as not to reflect upon the ability and the earnest devotion of the conservative. The latter policy has the complexion of personal attack, not intended, of course, but it is almost sure to lead to retrogression rather than progression.

Conservatism does not mean stagnation by any means. One of our famous statesmen has said: "More advancement is made along the line of conservative progress than by radical, half-baked ideas which sound well, but which only too often lead to disaster."

L. E. SAYRE.

PERIODS IN THE GROWTH OF NATIONAL ASSOCIATIONS.

National organizations reach a period in their growth when their leaders become deeply concerned over what steps should be taken to keep them efficient and of the maximum usefulness to all whom such organizations should serve.

When the membership of these organizations reaches into the thousands, scattered from Canada to the Gulf of Mexico and from ocean to ocean, the problem of handling the business, enlisting the interest of many other thousands eligible for membership, and of greatly enlarging its general influence, becomes an acute one.

The writer believes that the American Pharmaceutical Association has now reached such a period in its growth. It is the one pharmaceutical clearing-house that America has.

Among those who have worked for a generation to make it efficient are several score of men of the very highest type—capable, straight, far-seeing, loyal; representative of the very best in American Pharmacy. They have given unstintingly of their time and labor to make the American Pharmaceutical Association the best organization possible. They have done a good work, and as a result we now have a nucleus capable of doing for American Pharmacy much the same kind of work that the American Medical Association has done for medicine.

In order to take advantage of this pressing opportunity—for it seems to me nothing less—those entrusted with the management of its affairs should begin promptly to plan for much bigger things. Possibilities of the American Pharmaceutical Association are far too big for its future development to be vested entirely in men whose chief work is something else than the business of the Association. I suppose no organization of any kind has more efficient officers; but, with one exception, all of them are men who have large professional or business obligations and simply cannot give the matters of the Association the time, thought, or constructive effort that is needed.

If this be a true statement of the facts, what are the next steps in the Association plans? How shall the magnificent work that has already been done be capitalized to the maximum for the future of American Pharmacy? The writer would like to see a full discussion of this matter through the Pharmaceutical

Press. He believes that unless it is given the prompt consideration which the exigencies of the case seem to demand, the American Pharmaceutical Association will have lost its greatest opportunity for a larger service to all of American Pharmacy.

WORTLEY F. RUDD.

CHEMISTRY OF HEPTANE AND ITS SOLUTION.

BY EDWARD KREMERS.

1. INTRODUCTORY REMARKS.

The object of this brief introduction is not to describe the preliminary survey which has been made during the past four years, much less to dwell on the theoretical aspects of the subject. Its purpose is merely to acquaint those interested with the subject how few and short were the steps that led from the investigation of certain phases of plant chemistry to the general study of chemistry as it reveals itself within the narrow aspects of so highly selective a solvent as this saturated hydrocarbon. Those theoretical aspects that seem to demand immediate attention, will be considered briefly in connection with the respective chapters. After the preliminary survey, that has been made hastily and for the most part qualitatively thus far, will have been supplemented by more carefully repeated experiments, conducted quantitatively wherever possible and whenever desirable, it may seem apropos to dwell on the more general theoretical phases of this "new chemistry" as it has been called.

Even to phytochemists and to those interested in the chemistry of the "terpenes and camphors," to use a phrase made familiar by Wallach's one hundred and more classical contributions to organic chemistry published in the *Annalen*, it may not be generally known that as early as 1871, Wenzell,[1] an ex-pharmacist in San Francisco, revealed some of the peculiar properties of abietene, erasine and aurantine, by which names the oil from the Digger's pine, *Pinus sabiniana*, was locally known. Wenzell's publication attracted the attention of Thorpe, who demonstrated by elementary analysis and the study of its physical properties that this unusual oil consisted principally of normal heptane. Somewhat later, under the guidance of Schorlemmer, whose classical researches on the methane hydrocarbons qualified him particularly to direct the investigation, the same scientist proved chemically that his physical determinations had led him to a correct conclusion.

Ever since the occurrence of heptane in quantity had been demonstrated in the Digger's pine, it has been of special interest to phytochemists. The discovery of the same hydrocarbon in another California species, namely the Jeffrey pine, *Pinus Jeffreyi*, also its discovery in the fruits of *Pittosporum resiniferum* of the Philippines, known as petroleum nuts, has added to the phytochemical interest in this hydrocarbon.

Though there are said to be thousands of acres of forests of *Pinus sabiniana* and *Pinus Jeffreyi* in the mountains of California, it has been by no means an

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[1] For a review of the early history of heptane from conifers, see W. T. Wenzell, on "Abietene," *Pharm. Rev.*, 22, 408, 1904.

easy matter to secure an abundance of this material. Thanks to the coöperation of the Forest Products Laboratory and of the District Forester, also of Mr. D. F. Fryer, of Santa Rosa, California, it has been possible in recent years to secure larger amounts of the oils from both species, though the product was at times mixed with the oil of Western Yellow pine, with which the Digger's pine grows and with which it is apt to be confounded by the workmen who box the trees and collect the oleoresin.

Phytochemically, the writer's interests were at first directed to the study of the approximately two percent of constituents other than heptane, also to the study of the resin which results after the volatile constituents have been removed from the oleoresin by distillation. As soon as the heptane was obtainable in liter quantities, its use for a laboratory experiment in elementary organic chemistry suggested itself. Although all of our organic texts point out the importance of chlorine substitution in connection with the saturated hydrocarbons of the methane series, there appears to be not a single laboratory manual which gives an experiment to impress the student with this important property. What could be more instructive to the beginner in organic chemistry than to repeat Schorlemmer's classical experiments on the constitution of the methane hydrocarbons in connection with this pure heptane. Hence, whenever material was available, it was used for this purpose in the laboratory.

In his general phytochemical work, the writer has long emphasized the importance of computing percentage composition with reference to absolutely dry material. In this connection he also pointed out that the older methods for drying were often unsatisfactory and, when applied to such products as cloves, altogether wrong and beneath criticism. Hence, his classes in phytochemistry have been made acquainted with the xylene method, as applied to moisture determinations of woods impregnated with creosote, a problem analogous to that encountered in drugs and other materials rich in volatile oils such as the cloves already referred to.[2]

A more careful study of this problem, however, revealed certain disadvantages in the use of xylene, disadvantages that were at times increased rather than diminished by the substitution of such substances as the terpenes for xylene. Heptane, with its boiling point so closely approximating that of water, suggested itself as an ideal substitute. Experience soon taught that it also has its limitations, but it also taught something far more important.

So highly mucilaginous a drug as squill is exceedingly unsatisfactory when its moisture content is determined by the older methods. The use of the heptane modification of the xylene method proved much more satisfactory. Its application also revealed a fact of greatest importance to phytochemical analysis, *viz.*, that, as a highly selective solvent, its use in the moisture determination may casually reveal the presence of other constituents than water. In the case of squill, the "scillain," or whatever the substance may have been, crystallized out from the residual heptane in beautiful crystals.

Highly satisfactory as was this observation, the suggestion naturally presented itself at once that other constituents of the examined material might re-

[2] Unpublished results deposited as theses in the Library of the University of Wisconsin.

main in solution. Thus while crystallization from the filtered and cooled heptane solution would naturally be more than welcome, there was no reason why a heptane solution, free from most of the admixtures which are found in alcoholic and similar extracts, should be discarded without at least an effort to ascertain something about the nature of the dissolved constituents.

In order to ascertain something about the nature of such solutions, the most promising line of attack seemed to be the study of alkaloidal drugs, or, better still, of the alkaloids themselves, since even very small amounts can be detected readily by general alkaloidal reagents. Thus a beginning was made with morphine and other alkaloids. No sooner had this line of investigation been begun than it became apparent that the use of alkaloidal reagents not in aqueous solution, but in heptane solution, became desirable. Hydrogen chloride in heptane solution having been prepared for this purpose, what more natural than to prepare a solution of ammonia in heptane and bring these two heptane solutions together and witness the precipitation of ammonium chloride resulting from the addition of hydrogen chloride to ammonia both in heptane solution. Simple and self-evident as is this phenomenon to the investigator, to the chemist who thinks, it becomes a matter of significance.

From this insignificant beginning to a thousand and one experiments is a story of four years of "playing" at chemistry. Yet it was a playing that was rich in interesting observations and ofttimes in surprising results. Indeed, each and every new experiment performed suggested ten new experiments, so that the mind at times became overstimulated and a respite of shorter or longer duration had to be taken.

With such an irrepressible stimulus to pass from one new experiment to another, careful study of individual reactions and products became a mental, if not a physical, impossibility. Hence, the detail work had to be assigned to others. Practical applications had to be ignored almost entirely for the time being. In order to cover the field in a rational way, the reverse order of the periodic system was taken as guide, with this exception, however, that the hydrohalogens were studied before the halogens. The practical reason for this is apparent without comment to every chemist at all acquainted with the chemistry of the hydrocarbons of the methane series. In reporting certain phases of the work, the order just indicated may not always be followed.

The writer is by no means unaware that others have worked with petroleum hydrocarbons as solvents. Indeed, twenty-five years ago, while physical chemists of the Ostwald school knew of but one chemistry only, namely that of the aqueous solution, and this only in extreme dilution, he advocated the use of the non-aqueous solvent. The study of the peculiar behavior of a group of isomeric nitrosochlorides: true simple nitrosochlorides, isonitrosochlorides and bisnitrosochlorides, also of related compounds, in different organic solvents had even then impressed upon him the importance of the chemistry of solutions other than the aqueous; though the dilute aqueous solution at that time was the only orthodox one. The significance of heptane as a solvent is at least three-fold.

It is a saturated hydrocarbon of the limit series and in this respect differs materially from the other hydrocarbons that have been used by various investigators.

So far as the previous use of hydrocarbons of the methane series is concerned mixtures only have been employed. The heptane from both the Digger's and Jeffrey pines appears to be devoid of isomers and homologues and the small amount of impurities present in the natural products can be removed by a variety of new ways, as has been ascertained in the preliminary survey already alluded to. In heptane, a distinctively chemical unit, capable of a high degree of purity, is now made available; hence not only more satisfactory qualitative work can be done, but, what is possibly more important, quantitative work as well.

Heptane is not only volatile, but its boiling point lies very close to that of water, the most common solvent used. Moreover, its boiling point lies only twenty degrees higher than that of alcohol, the most common of the organic solvents employed in chemical work.

A disadvantage of the heptane, namely, its highly selective solvent property, frequently turns out an advantage, for it is remarkable how many substances can be prepared in this solvent by the precipitation method. Indeed, in many of the innumerable organic reactions performed, the writer was again and again reminded of his early chemical work in qualitative inorganic analysis. So simple were many of the reactions that the writer has referred to his work as "playing" at chemistry. This does not imply, however, that many of the precipitates are as simple as at first supposed. Indeed, much painstaking detail work will have to be done in order that the secrets of this chemistry of the heptane solution may be properly revealed.

CHEMISTRY OF THE HEPTANE SOLUTION.

BY EDWARD KREMERS.

2. REVISION OF THE PHYSICAL CONSTANTS OF HEPTANE.

BY ROLAND E. KREMERS.

The physical constants for normal heptane, so painstakingly determined by Thorpe for the hydrocarbon obtained from the Digger's pine, are possibly among the most accurate on record for a hydrocarbon of the methane series. However, if one stops to consider that the hydrocarbon so carefully investigated physically by Thorpe had an optical rotation of 6.9′, it becomes apparent at once that the material examined by him must have been impure. Normal heptane should be optically inactive. The angle of rotation can readily be accounted for by assuming that in the collection of the oleoresin, the collector did not discriminate sufficiently between *Pinus sabiniana* and other species of pine yielding pinene, *e. g.*, *Pinus ponderosa*.[1] That such mistakes have been made has since then been demonstrated repeatedly. Thus, *e. g.*, an oleoresin presumably from Jeffrey pine, which likewise produces heptane in place of pinene, contained about one-third or more of the oleoresin of *Pinus ponderosa*, with which this species is readily confounded by the workmen. This oleoresin was distilled and the oil examined in this laboratory by R. J. Harnon.[2] In like manner the admixture of a pinene oleoresin with the oleoresin of *Pinus sabiniana* has since then been observed in the Forest Products Laboratory.[3] Hence, with an unusually pure heptane at our disposal, it seemed highly desirable to re-determine the physical constants and to compare them with those of Thorpe.

Material.—The material used in this investigation was obtained in January, 1913, through the kind coöperation and liberality of the Forest Products Laboratory at Madison, Wisconsin. It consisted of fifteen five-gallon cans of oleoresin of Digger's pine or *Pinus sabiniana*. The oleoresin is obtained by boxing and was collected in Sierra National Forest, California.[4] Some of the cans were labeled "second grade," one "poor grade." The assumption is that the remaining cans were to be considered as first grade.

The oleoresin as received was a viscous semi-liquid.

Distillation of the Oleoresin.—This was distilled during the week beginning December 29, 1913, in the 60-liter Lentz still of the Department. The distillation was effected by passing steam into the oleoresin as well as into the jacket space of the still. The oil separated rapidly from the water of the distillate and a rough separation was effected by means of a separatory funnel. The oil from each can was united, but kept separate from the rest. The aqueous distillate was reserved for cohobation. The contents of one can were found to make a convenient charge. Five cans was the maximum amount handled in a seven-hour day. When the volatile oil about ceased to distil, the distillation was stopped, the residue allowed to settle, whereupon the resin rose to the surface, and the water was largely decanted into the cans. The resin, while hot, was emptied into wooden boxes and upon further cooling solidified.

On February 2, 1914, the cohobation of the aqueous distillate was commenced. About forty liters were emptied into the still as a single charge. Steam was passed into the water only until distillation had begun, whereafter the heat from the jacket alone sufficed. When the aromatic odor of the distillate became somewhat less pungent, distillation was stopped and the residue discarded. In this manner about 45 liters were collected. These were again cohobated and the first 8 to 10 liters collected. At first the distillate was milky, later it cleared with a slight separation of an oil on the surface. This oil was collected separately.

The following table records the description of the crude material, the amount of oil obtained, and the density of the oil at 20° as determined by means of a Mohr-Westphal balance:

Experiment.		Description of oleoresin.	Amount of oil. Cc.	Sp. gr. at 20° C.
1.	Dec. 29.	"Second grade"	1750	0.686
2.	Dec. 29	"A"	2090	0.685
3.	Dec. 30	"A"	2300	0.685
4.	Dec. 30	"A No. 5"	2390	0.685
5.	Dec. 30	"A No. 5"	2240	0.685
6.	Dec. 30	"A No. 4"	1950	0.685
7.	Dec. 30	"A No. 5"	2500	0.685
8.	Dec. 31	"A No. 3."	1875	0.685
9.	Dec. 31	"A No. 3"	2170	0.685
10.	Dec. 31	"A No. 4"	2725	0.685
11.	Jan. 2	"A No. 2"	2415	0.686
12.	Jan. 2	"A"	2440	0.685
13.	Jan. 2	"No. 8, second grade"	1110	0.685
14.	Jan. 2	"No. 7, second grade"	1725	0.685
15.	Jan. 2	"Poor grade"	1451	0.685
Total			31,131	

Assuming the total weight of oleoresin approximately to have been 600 lbs., 1 gallon of 8 pints with a density of 1.00,[5] the average yield of oil may be assumed to be approximately 7.8 percent. The best yield (Experiment 10) on the same assumption, is 9.4 percent, the poorest yield (Experiment 13) 4.2 percent. A comparison of these yields with those obtained by previous investigators is afforded by the data recorded in the following table:

Investigator.	Yield, percent.
Rabak[6]	7.3
Schorger[7]	11.4
R. E. K.[8]	7.8

Fractionation of the Oil.—With the exception of the small amount of oil obtained by the cohobation of the aqueous distillation, all of the fifteen oils obtained by the steam distillation of the oleoresin were united and fractionated by steam. For the greater part of the distillation the heat of the steam jacket sufficed. The residue was driven over by passing steam into it, hence was distilled with water vapor, and the oil thus obtained separated in the usual manner. The bulk of the oil, distilled by itself, was collected in liter fractions, thirty-one such fractions, all colorless, being obtained. Fraction 32 consisted of about 100 Cc. of a mobile yellow oil of an agreeable odor and was obtained by separation from the aqueous distillate as already indicated. In the following table the densities of these fractions, as determined with the aid of a Mohr-Westphal balance, are recorded:

Fraction.	Sp. gr. at 20°.	Fraction.	Sp. gr. at 20°.	Fraction.	Sp. gr. at 20°.	Fraction.	Sp. gr. at 20°.
1	0.6835	9	0.684	17	0.684	25	0.685
2	0.684	10	0.6835	18	0.684	26	0.6845
3	0.684	11	0.684	19	0.684	27	0.685
4	0.684	12	0.684	20	0.684	28	0.685
5	0.684	13	0.684	21	0.6845	29	0.685
6		14	0.684	22	0.684	30	0.685
7		15	0.684	23	0.684	31	0.7081
8		16	0.684	24	0.685	32	0.8300

Purification of Heptane.—Although the density of most of the fractions of the Digger's pine oil revealed that they consisted of an unusually pure heptane, a chemical purification seemed desirable for a revision of the physical constants of this natural hydrocarbon. For this purpose a liter fraction of the oil was thoroughly shaken with 100 Cc. of concentrated sulphuric acid. While the acid darkened readily, no appreciable amount of heat was evolved. The dark colored acid was removed and a second 100 Cc. were employed. For a third shaking a like amount of fuming sulphuric acid was used. After these three treatments, the oil had a decided odor of sulphur dioxide which was removed by shaking the oil with a solution of sodium carbonate. This having been separated, the oil was shaken vigorously with a one percent solution of permanganate, a few Cc. being used at a time, until the permanganate color was no longer destroyed. The heptane thus purified was distilled, a small first fraction and a small last fraction being kept separate from the bulk of the distillate.

Fractions 1, 5 and 10 of the Digger's pine oil were thus purified. The loss involved in the purification of Fraction 10 of 1056 Cc. amounted to 24 Cc., hence was less than 2.5 percent. By way of control a few of the physical constants were determined. Thus it was desirable to ascertain before proceeding further whether the fractions contained any appreciable amount of optically active ter-

pene. The circular rotation for fraction 1 was found to be 0.10° in a mm. tube. The specific gravity of Fraction 5, as determined by a Mohr-Westphal balance, was found to be 0.6838 at 20°; the index of refraction of Fraction 10, as determined at 20° by means of an Abbé refractometer, was 1.3880.

In spite of the purification, or possibly because of the nature thereof, all three fractions when thus purified had a decided spicy odor. Attributing this to the presence of small amounts of oxygenated compounds that had either not been destroyed by the purifying agents or had been produced by them, metallic sodium in the form of wire was added and the contents of each bottle shaken from time to time. Although a large number of extremely minute bubbles were formed at first, the surface of the sodium wire remained essentially unchanged, so small was the action. Nevertheless, the spicy odor did not disappear entirely. The index of refraction of Fraction 10 of the purified oil, after the treatment with sodium, was 1.3895 at 20°.

For the more careful determination of the physical constants, the fraction or fractions used were subjected to a final purification in the fractional distillation which they underwent in the determination of the boiling point.

Physical Constants.—The following physical constants were determined in the laboratory for Physical Chemistry. The writer wishes to acknowledge his indebtedness to the kind assistance and supervision of Professor J. H. Mathews in this work.

Boiling Point.—The boiling point was determined in connection with the final purification by distillation. Electrical heating was secured by passing a current through a platinum spiral that was immersed in the heptane. The thermometer employed was graduated to 0.5° C., and had been standardized by the Reichs Anstalt. In the course of an hour and a quarter the temperature rose from 96.0° to 96.4° under a barometric pressure of 739 mm. The further determinations were made on the distillate which amounted to some 300 Cc. after a "Vorlauf" of several Cc. had been set apart. A residue of about 600 Cc. became necessary because the platinum coil became exposed. Corrected according to the following expression:

$$C = 0.00012(760 - b)(273 + t),$$

where C is the correction, b the observed barometric pressure, and t the observed degrees, on the centigrade scale, the boiling point under 760 mm. becomes 97.33° C.

Optical Rotation.—As a check upon the purity a determination of the optical rotation was made. The polarimeter employed was of the usual laboratory type made by Schmidt and Haensch. To insure monochromatic light a bichromate cell was used. Within the limits of error of the instrument the optical rotation at 20° C. was found to be zero.

Density.—By means of a large pyknometer a determination of the density was made at two temperatures.

$$d_{20°} = 0.68288$$
$$d_{40°} = 0.66623$$

Surface Tension.—The surface tension was computed by the expression:

$$\gamma = \tfrac{1}{2}\, g\, r\, h\, d$$

the cathetometer employed was one constructed by the "Geneva Society for the

Construction of Physical Instruments," Geneva, Switzerland. The radius of the tube was found to be 0.0360 cm. This value represents the average result of five independent observers. The average of the elevations was found to be:

$$h_{20°} = 1.6425 \text{ cm.}$$
$$h_{40°} = 1.5569 \text{ cm.}$$

The computation gave the following values:

$$\gamma_{20°} = 19.80 \text{ ergs.}$$
$$\gamma_{40°} = 18.316 \text{ ergs.}$$

Index of Refraction.—By Abbe refractometer:

$$n_{20°} = 1.3895.$$

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3. Personal Communication.
4. See letter from C. Stowell Smith to E. Kremers, Dec. 2, 1912.
5. Schorger, *Bull.* 119, Forest Service.
6. *Pharm. Rev.*, vol. 25.
7. *Bulletin* 119, Forest Service.
8. Inasmuch as some of the cans were not very carefully sealed, the average yield may have been lowered somewhat by evaporation.

THE INFLUENCE OF HYDROCHLORIC ACID ON CINCHONA PREPARATIONS.*

BY WILBUR L. SCOVILLE.

It has been observed that in the extraction of cinchona with acidulated menstrua, erratic results are sometimes obtained. In some instances the alkaloids are extracted rapidly and in others very slowly, and that under seemingly parallel circumstances. While the very slow extractions are comparatively rare, they are frequent enough to warrant an investigation. The following experiments were therefore undertaken.

Five hundred grammes of cinchona calisaya assaying 7.1 percent of alkaloids by the U. S. P. process, was percolated with a neutral menstruum consisting of 4 volumes of alcohol with 1 volume of water, and another portion of 500 grammes was percolated at the same time with an acidulated menstruum of the same alcoholic strength but containing 50 mils of diluted hydrochloric acid in the first 500 mils of menstruum. Percolation was conducted as evenly as possible and the percolates received in 400 mil, then 500, 500, 500 and 500-mil portions. Each fraction was then assayed for alkaloidal strength, and the results are as follows:

	Neutral menstruum.		Acid menstruum.	
	Gm. per 100.	% of exhaustion.	Gm. per 100.	% of exhaustion.
First 400 mils	4.2	47.5	5.0	56.5
First 500 mils	1.4	19.77	1.7	24.0
Second 500 mils	0.65	9.25	0.61	8.64
Third 500 mils	0.25	3.53	0.26	3.7
Fourth 500 mils	0.112	1.58	0.110	1.55
Totals		81.63		94.39

*Read before Scientific Section, A. Ph. A., City of Washington meeting, 1920.

Here is shown a distinct advantage in the use of acid, in that the drug was exhausted more rapidly and also more completely. After standing 21 months both fluidextracts have deposited a considerable gummy precipitate which adheres to the bottom and sides of the bottle, the only observable difference being that the acid preparation is slightly smaller in quantity and the more flocculent. It is to be noted that these fluidextracts contain no glycerin.

Three tinctures were also made from 200 Gm. of the drug, percolating to 900 mils. One was a neutral tincture, made by percolating with a mixture of two volumes of alcohol and one of water, the second contained 20 mils of diluted hydrochloric acid in the 150 mils of menstruum in which the drug was macerated, and the third 40 mils of acid, the alcoholic strength being the same in all cases. The drug was moistened with the neutral acid menstruum, allowed to stand 24 hours, then percolated in the usual manner. No glycerin was used in these menstrua.

The 900 mils of neutral tincture assayed 1.1 Gm. of alkaloid per 100, showing an exhaustion of the drug of 70.5%, the 0.2% acid tincture assayed 1.37. Gm. per 100, showing 87% of exhaustion, and the acid (0.4%) tincture assayed 1.45 Gm. per 100, showing 91% exhaustion. Here again the advantage of acid in extraction is shown, and a considerable excess of acid is more efficient than less. After standing 21 months there is a slight precipitate in the neutral tincture, much less in the weaker acid, and none in the stronger acid tincture. In this case the acid shows a marked advantage in stabilizing the tincture as well.

Similar experiments were then carried out on red cinchona, assaying 10.5% of total alkaloids, a neutral and acid fluidextract being prepared, using the same process and menstrua as on cinchona calisaya. Following are the results:

	Neutral menstruum.		Acid menstruum.	
	Gm. alkaloids per 100.	% of exhaustion.	Gm. alkaloids per 100.	% of exhaustion.
First 400 mils	4.85	36.77	5.86	44.5
First 500 mils	2.35	22.37	3.37	31.9
Second 500 mils	0.78	7.40	1.30	12.3
Third 500 mils	0.42	4.03	0.41	3.87
Fourth 500 mils	0.18	1.75	0.16	1.50
Total		72.32		94.07

Here again the advantage of acid is shown. To ascertain whether an increase of acid would be of further advantage, 1000 Gm. of the drug was moistened with a mixture of 600 mils of alcohol, 55 mils of 37% hydrochloric acid and 95 mils of water, then percolated with a menstruum of 4 volumes of alcohol and one volume of water.

This tested as follows:

	Alkaloids per 100.	Percent of exhaustion.
First 800 mils	5.25	42.0
First 1000 mils	3.45	34.5
Second 1000 mils	0.93	9.33
Third 1000 mils	0.25	3.15
Total		88.98

Here we find a slower rate of exhaustion than when less acid is used. It is not easy to explain this. The acid evidently is not simply concerned with forming soluble and acid salts with the alkaloids, but has an influence also on other constituents. The alkaloids contained in this lot of cinchona would require approximately 12 Gm. of hydrochloric acid to form hydrochlorides, and 10.5 Gm. per 1000 was used in the first extraction and 24 Gm. in the second. Thus in the second acid extraction enough acid was u sed to convert all of the alkaloids into the acid hydrochlorides, yet extraction was less rapid or complete when less acid was used than would be required to form the normal chlorides.

A possible explanation, suggested by the differences in precipitation in the neutral and acid preparations, would be that the acid causes the tannoid bodies to become insoluble, or less soluble, and that the alkaloids are partially occluded in this process. But an attempt to throw down the tannoids by adding acid to the neutral solutions resulted negatively, and the question is still open. Like the calisaya fluidextracts the fluidextracts of red cinchona show slightly less precipitation in the acid than in the neutral fluidextracts.

Three tinctures were made, using the mixed drugs for Compound Tincture of Cinchona, but no glycerin in the menstruum. The neutral menstruum consisted of two volumes of alcohol and one of water, and the acid tinctures contained 10 mils and 20 mils, respectively, of 10% hydrochloric acid. The neutral tincture assayed 0.875 Gm. of alkaloids per 100, showing 74.6% exhaustion, the lower-acid tincture assayed 0.935 Gm. per 100, showing 80% exhaustion, the higher acid tincture assayed 1.00 Gm. per 100, showing 85.8% exhaustion. In this case increasing the acid added to the efficacy of the menstruum.

There is also shown a very marked difference in precipitation. The neutral tincture has a considerable adherent precipitate, the lesser acid has a slight precipitate at the bottom, and the more-acid tincture has only a faint precipitate on the sides of the bottle. Here again the acid added to the stability of the preparations as well as aided in extraction.

For reasons of stability alone, the use of acid in the fluidextracts and tinctures of cinchona is, therefore, desirable, in preparations of red cinchona as well as yellow. Sufficient acid to convert the alkaloids into normal hydrochlorides should be used, and this will amount to 100 mils of 10% hydrochloric acid per 1000 Gm. of drug. More acid may accelerate extraction, but the difference is not great. Whether more acid will further add to the stability is yet to be learned. Apparently it will, but the examples here are too few to draw conclusions thereon.

It is plain, however, that the addition of hydrochloric acid to the formulas for tinctu re of cinchona and compound tincture of cinchona is desirable.

The effect of acid was next tried on the assay of cinchona. Each was again assayed by the U. S. P. process and also by treating 5 Gm. of the ground drug with 5 mils of a mixture of one volume of hydrochloric acid (37%) with two volumes of alcohol. The drug was thoroughly moistened with this mixture, and allowed to dry in the air, then treated as in the U. S. P. process. The following results were obtained:

Cinchona calisaya,	U. S. P. process	7.06 and 7.10%
	acid process	6.60 and 6.62%
Red cinchona	U. S. P. process	10.55 and 10.56%
	acid process	9.80 and 9.97%

In each case the acid process gave lower results than the U. S. P., which was quite unexpected. But there was a noticeable difference in the appearance of the alkaloidal residues; those obtained by the acid method were lighter in color and more clearly soluble. The residues were, therefore, dissolved in an excess of deci-normal hydrochloric acid and titrated with fiftieth-normal alkali, using methyl red as indicator.

The calisaya residues gave a fairly sharp end-point and showed 5.72% and 5.76% of alkaloid by the U. S. P. process and 5.95 and 6.12% by the acid process. The red cinchona gave an uncertain end-point, and the results were 8.80 and 8.97% by the U. S. P. process and 9.62 and 9.70% by the acid process. This shows a reversal of the first figures, the acid method giving higher results by titration and showing that the alkaloid obtained is purer than by the U. S. P. method. This was further proved by second trials of the two methods in which the alkaloids were purified by dissolving in an excess of deci-normal acid, the solution neutralized and allowed to stand 24 hours, then filtered and the alkaloids re-extracted, yielding 8.77 and 9.15% by the U. S. P. process and 9.10 and 9.12% by the acid process for red cinchona and 6.8 and 7.05% by U. S. P. and 6.80 and 6.82% by the acid process on calisaya. This again shows that the U. S. P. assay process yields a very impure alkaloidal residue for weighing.

A modification of Fromme's method (acid) was also tried on both drugs. This consisted in mixing 5 Gm. of the drug with 10 mils of diluted hydrochloric acid and 10 mils of water, digesting on the water bath during one hour, then cooling and shaking with 200 mils of ether-chloroform and an excess of sodium hydroxide, the assay being finished as in the U. S. P. process. Calisaya cinchona gave 6.82 and 6.92% gravimetric and 6.07 and 6.25% volumetric, and red cinchona 9.8 and 9.87% gravimetric by this process.

Several modifications of the acid method were tried, consisting of variations in the amount of acid used and the length of time of digestion. The results were within the normal limits of variation in gravimetric assays. The highest result was obtained when 5 Gm. of drug was heated in a mixture of 5 mils concentrated hydrochloric acid and 15 mils of water for one-half hour, then allowed to macerate over night and shaken in 200 mils of ether-chloroform and 10 mils of concentrated (25%) ammonia water. This gave 9.92 and 10.2% of total alkaloids. Evidently the acid method of assay gives more reliable and accurate results than the U. S. P. method. The alkaloidal residues are purer.

The ether-chloroform mixture directed by the Pharmacopoeia is a mixture of two volumes of ether with one of chloroform. This has a specific gravity at 25° C. of 0.983, which is so close to that of water that the aqueous acid does not separate completely and five to eight shakings are required to extract all the alkaloid. It was found that a mixture of 3 volumes of ether with one of chloroform is quite as efficient as a solvent and requires fewer extractions with acid because the acid separates more quickly and completely. This is a decided advantage.

The following method for the assay of cinchona is recommended: To 5 Gm. of powdered cinchona contained in a 250-mil flask, add 15 mils of water and 5 mils of hydrochloric acid. Mix well and digest two hours on the steam bath (or macerate over night). Cool and add 200 mils of a cooled mixture of 3 volumes of ether and 1 volume of chloroform, then add 10 mils of stronger water of ammonia.

Shake frequently during 12 hours, allow to separate, and decant 160 mils (representing 4 Gm. of cinchona). Extract the alkaloids from this by successive shakings with weak sulphuric acid, mix the acid solutions, add an excess of ammonia and extract with successive portions of chloroform. Evaporate (or distil) off the chloroform, add 5 mils of alcohol to the residue, again evaporate, dry at 100° C. and weigh.

SUMMARY.

Hydrochloric acid not only facilitates the extraction of alkaloids from cinchona red as well as yellow, but it also stabilizes the preparations by reducing precipitation. Acid should be used in at least sufficient amount to convert the alkaloids present into normal hydrochlorides. The use of this acid is, therefore, recommended for tincture of cinchona and compound tincture of cinchona, as well as for all fluidextracts and extracts of cinchona. The influence of acid in promoting stability is shown more clearly in another paper.

In the assay of cinchona a preliminary treatment of the drug with hydrochloric acid results in a purer alkaloidal residue for either weighing or titration, hence is more accurate. The results, while less than by the present official process, are more nearly correct. The process is also improved by changing the proportions of ether-chloroform from 2 to 1 to 3 to 1.

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THE FUNCTION OF GLYCERIN IN TINCTURES AND FLUIDEXTRACTS.*

BY WILBUR L. SCOVILLE.

A considerable number of our fluidextracts and tinctures contain a small proportion of glycerin, usually ten percent by volume, which is employed to prevent or reduce precipitation. That it often is efficacious in this respect is beyond doubt. There is also a marked tendency toward an increased use of glycerin for this purpose, and in nearly all cases the glycerin is employed as a solvent, being a part of the menstruum used in extracting the drug.

It has also been observed that, other things being equal, percolation is not as rapid when glycerin comprises a part of the menstruum as when it is absent, and furthermore it is thought that drugs do not exhaust as rapidly when a glycerinated menstruum is employed as when alcohol-water only is used. This latter impression may come from the slower flow of the glycerinated percolate, or it may be that glycerin is not as good a solvent as has been thought.

The question how glycerin acts in preventing precipitation seems never to have been investigated. Does glycerin act through its solvent power? Or does it prevent precipitation by hindering oxidation or other chemical changes in the drug extracts? Or is the added viscosity an important factor? Is it most effective when used in the menstruum or when added to the (over-strength) percolate? These questions are worth investigating. In this paper the investigation has been confined to preparations official in the U. S. Pharmacopoeia and the National Formulary.

*Read before Scientific Section, A. Ph. A., City of Washington meeting, 1920.

The method adopted has been to extract two different portions of the same lot of drugs, under as nearly equal conditions as possible, using the official glycerinated menstruum on one portion and an alcoholic menstruum of the same alcoholic strength on the other. Care was taken to have the temperatures, rates of flow and size and form of percolates equal or, when different quantities were percolated, relative. Thus, when 250 Gm. of drug was percolated with a glycerinated menstruum and 750 or 1000 Gm. with the alcoholic menstruum, the required amounts of percolates were obtained in the same time, or as nearly as possible. The rate and conditions of exhaustion were, therefore, the same.

The preparations made with glycerinated menstrua were finished in the usual way. Those made without glycerin were adjusted to strength by means of the menstruum, and also by addition of glycerin in the same amounts as used in official preparations, by addition of sugar and menstruum, and by addition of glucose and menstruum. The corresponding preparations were all finished on the same day, were compared for color and strength, and were then set aside to observe their keeping qualities. In adding sugar or glucose to different samples we get some information regarding the action of chemical retardance and also of added viscosity in preventing precipitation.

In many instances the percolates for making fluidextracts were collected in fractions, the first being 80 mils for 100 Gm. of drug, the second, third, fourth and fifth being 100 mils each. These were examined separately to learn the rate of extraction.

ALKALOIDAL DRUGS.

The only official alkaloidal preparations containing glycerin are the fluidextracts of cinchona and hydrastis, and the tinctures of cinchona. This study was coupled with a study of the influence of hydrochloric acid on cinchona (reported in another paper), and the percolations were made to serve a double purpose.

Cinchona.—Both calisaya and red cinchona were tried. Unfortunately, in the list of 48 different preparations made, the relative rates of exhaustion of cinchona with and without glycerin were overlooked. But the results on the tinctures indicate clearly the influence of glycerin on this drug.

Tincture of calisaya made with two-thirds alcohol assayed 1.11 Gm. of alkaloids per 100 (from a 7.1% drug), showing 70.5% of exhaustion. A corresponding tincture made with the official glycerinated menstruum assayed 1.02 Gm. of alkaloid per 100, showing 66.1% of exhaustion.

When hydrochloric acid was used in the menstruum the resulting tinctures assayed, (*a*) with glycerin 1.2 Gm. per 100 or 78.1% exhaustion, (*a*) without glycerin, 1.37 Gm. per 100 or 87% exhaustion; (*b*) with glycerin acidulated, 1.42 Gm. per 100 or 90% exhaustion; (*b*) without glycerin acidulated, 1.45 Gm. per 100 or 92% exhaustion. More acid was used in (*b*) than in (*a*).

Compound tincture of cinchona, made from a red cinchona assaying 10.55% of alkaloids, showed:

With glycerin 1.0 Gm. per 100 or 85.8% exhaustion.

Without glycerin 0.975 Gm. per 100 or 74.6% exhaustion.

With glycerin, acidulated, 1.02 Gm. per 100 or 87% exhaustion.

Without glycerin, acidulated, 0.935 Gm. per 100 or 80% exhaustion.

Here we find a retarding effect of glycerin in extracting calisaya and an accelerating effect on red cinchona.

Fluidextracts of both drugs were adjusted to contain 4.5 Gm. of alkaloids per 100 mils, and also to contain (*a*) no acid; (*b*) 1% of acid (hydrochloric) and (*c*) 2.5% of acid in red cinchona.

Samples of each also were adjusted to contain no glycerin, 10% of glycerin, 10% of granulated sugar and 10% of glucose. These have all been kept 18 to 21 months in 8 oz. amber bottles in a moderate light and an equable temperature.

The stability of these preparations is shown as follows:

TABLE SHOWING PRECIPITATION IN CINCHONA PREPARATIONS.

Preparation.	No glycerin.	Glycerin.	Sugar.	Glucose.
Calisaya Fluidextract				
Neutral menstruum.....	marked	slight trace	trace	slight
Acid menstruum.....	considerable	slight trace	slight trace	slight
Calisaya Tincture				
Neutral menstruum.....	considerable	(*a*) none (*b*) very slight trace	very slight trace	.....
Acid menstruum.....(*a*)..	none	none	none	none
Acid menstruum.....(*b*)..	none	none	none	none
Red: Fluidextract				
Neutral menstruum.....	considerable	very slight trace	very slight trace	considerable
Acid menstruum....(*c*)..	considerable	marked	marked	marked
Compound Tincture				
Neutral menstruum.....	considerable	(*a*) slight slight	considerable	considerable
Acid menstruum.....	(*b*) marked	(*a*) slight (*b*) slight	marked	marked
Acid menstruum.....	(*c*) slight trace	none	slight trace	slight trace

("*a*" indicates the preparation made with glycerinated menstruum, and (*b*) when glycerin was added to the percolate.)

With both cinchonas, acid is shown to be more efficient than glycerin in preventing precipitation but glycerin also shows a marked action. The results are the same whether the glycerin is used in the menstruum or is added to the percolate.

In the preparation of calisaya, sugar and glucose appear to be equal to glycerin in preventing precipitation, but not in those of red cinchona. In the latter sugar and glucose show no influence.

A further influence of glycerin in compound tincture of cinchona was seen, in that while 7.5% of glycerin reduced the precipitation from considerable to slight, 15% (in an extra test) almost entirely inhibited change. Furthermore, in reducing the percolate from 0.93 Gm. of alkaloids per 100 to 0.45 Gm. per 100, when the dilution was made with 64% alcohol, as directed in the Pharmacopoeia, considerable precipitate appears on standing, both on the bottom and sides of the bottles, while when diluted with the 64% alcoholic menstruum containing 7.5% of glycerin no precipitation has appeared in 18 months. Here is a suggestion that in diluting this tincture and the fluidextracts to standard strength, the proportions of glycerin as well as of alcohol should be maintained.

With regard to the greater influence of glycerin on red cinchona than on calisaya, both in facilitating extraction and in preventing precipitation, it is to be remembered that red cinchona is much richer in tannoid bodies and that glycerin is a particularly good solvent for these.

Hydrastis.—A drug assaying 2.98% of ether-soluble alkaloids was used. From this two fluidextracts were made, one with glycerinated (official) menstruum and one without glycerin. The several fractions of percolate were assayed, resulting as follows:

	Glycerinated menstruum.		No glycerin.	
	% alkaloid.	% exhaustion.	% alkaloid.	% exhaustion.
First fraction.....	2.52	67.5	2.86	76.78
Second fraction.....	0.72	24.16	0.55	18.45
Third fraction.....	0.094	3.15	0.03	1.00
Fourth fraction.....	0.02	0.67	0.009	0.38
Total.....		85.48		96.61

Here the glycerin shows a marked retarding effect on extraction.

Fluidextracts were then finished from each percolate, adjusted to 2% of ether-soluble alkaloids and the non-glycerinated percolate was divided into four portions and made to contain no glycerin, 10% of glycerin, 10% of sugar and 10% of glucose, respectively; adjusted to alkaloidal and alcoholic strength and set aside.

The percolate from the glycerinated menstruum was also divided, one portion being diluted to standard with 64% alcohol (as directed in the Pharmacopoeia), the other with 64% alcohol containing 10% of glycerin. After 17 months the precipitation in the sample which was diluted with glycerinated menstruum shows approximately the same amount of sediment as that diluted with hydro-alcohol, precipitation being slight in each case. The sample without glycerin contains the most sediment of all but even this is not heavy. The sample to which glycerin was added corresponds to the U. S. P. sample, and those containing sugar and glucose contain slightly more.

In this case both sugar and glucose have hindered precipitation but not quite as effectively as glycerin. The addition of glycerin to the percolate is preferable in this case because extraction is more rapid without it, and the influence on stability is just as good.

CATHARTIC DRUGS.

The two cathartic drugs whose preparations contain glycerin are rhubarb and juglans. In both of these the active principles are anthraquinone bodies, which give an intense red color with alkalies, and this reaction was used as a basis for estimating the relative extraction and activity of the preparations.

To 100 mils of distilled water, contained in a nesslerizing tube, was added 5 mils of stronger water of ammonia, then sufficient of the preparation to produce a pronounced reddish tint when viewed lengthwise through the tube, sufficient of each preparation being used to produce the same tint or depth of color. This gives the *relative* strength of two preparations of the same kind. Rhubarb was not compared with butternut, but only rhubarb with rhubarb, aromatic tincture with aromatic tincture, sweet tincture with sweet tincture, etc. Since the volume of water and its alkalinity are the same in each test, this should indicate the *relative* activity of the preparations tested, though it gives no indication of their absolute value.

The tints did not match in all cases, since glycerin, when used as a menstruum, extracts more of the coloring matters from most drugs than does alcohol-water, and this influences the tint obtained. Hence the figures are approximate only, and are useful as showing differences to an approximate extent. The fluidextracts of these drugs will show a very distinct red tint with alkali in dilutions of 1 in 50,000.

Rhubarb.—The percolates for fluidextract were received in fractions and tested separately. The figures which follow show the dilutions at which the red tints matched, and are good for each pair only. They are not interchangeable since no effort was made to match to a standard tint.

Fluidextract Rhubarb U. S. P.	1st	2nd	3rd	4th
Glycerinated menstruum.....	1 : 40000	1 : 10000	1 : 1000	1 : 700
No glycerin.....	1 : 50000	1 : 6000	1 : 2000	1 : 1000

This shows a marked retardation of extraction by glycerin. The glycerinated percolates were deeper in color, as received, but showed a less rapid exhaustion of the drug. The finished fluidextracts tested equal in cathartic activity (1 : 50,000 each) as nearly as could be judged but the glycerinated menstruum extracts so much more of the yellow color that it was difficult to judge the red tint produced by the alkali.

In specific gravity, the U. S. P. sample was 1.0625 and the sample to which glycerin was added, 1.0325. This indicates a difference in extractive matters in favor of the glycerinated menstruum. The medicinal value of rhubarb is due not only to its cathartic but also to its astringent principles, and it is probable that these are better extracted by the glycerinated menstruum.

In stability there is little choice between the five samples, after standing eighteen months. All have precipitated badly—there being about 3 millimeters of sediment in each 250-mil bottle but the sample without glycerin shows no greater precipitate than those with glycerin or with

sugar or with glucose. None of these protectives show any marked advantage in this preparation.

Tincture of Rhubarb, U. S. P.—This was made entire, and tests on the finished preparations show the U. S. P. tincture to be about one-tenth weaker that than made without glycerin. The specific gravities correspond to that of the U. S. P. tincture, being 0.9947, while that in which glycerin was added to the percolate is 1.0065.

In stability there is again little choice. All have precipitated badly—about 2.5 millimeters covering the bottoms of 250-mil bottles—and the sample containing no glycerin appears to be no worse than the others. Possibly there is a little less precipitate in the sample containing 20% of sugar than in the others, but the difference, if any, is small and may be ascribable to a slightly greater density in the precipitate.

Aromatic Tincture of Rhubarb, U. S. P.—This corresponds in a measure with the plain tincture, but the differences are not as great. The tincture made with glycerinated menstruum is about one-twentieth weaker than that without glycerin. The specific gravities are 1.0005 and 1.0075, respectively—in this case the official tincture being lighter.

In stability there is little choice. These samples have not precipitated nearly as heavily as the plain tinctures, and slight differences are more noticeable. The sample containing no glycerin appears the best, and there is no choice between the official tincture and the one in which glycerin was added to the percolate. Sugar (20%) seems to have reduced precipitation slightly and glucose to have increased it. But the differences are all too small to draw conclusions from, and are not marked in any case.

Sweet Tincture of Rhubarb, N. F.—Here again the N. F. (glycerinated menstruum) tincture tests about one-tenth weaker than the non-glycerinated. The specific gravities are 0.9823 and 0.9920, respectively—again a trifle lighter in the official tincture.

In stability there is also no choice, each 250-mil bottle showing about 4 millimeters of precipitate at the bottom.

For rhubarb the above series shows a distinct disadvantage in the use of glycerin in the menstruum where it decreased the solvent action and hinders extraction. But it shows no advantage in preventing precipitation, at least in the proportion in which it is used.

It should be noted that in the above tinctures the proportions of sugar and glucose used was 20 Gm. per 100, or double that which would correspond to the glycerin. This practically saturates the fluidextract (in which less than 10 Gm. per 100 dissolved) and probably nearly saturates the tinctures, but no advantage is seen in their use.

Butternut.—The fluidextract was percolated in fractions, and the different fractions tested as follows:

	1st.	2nd.	3rd.	4th.
Glycerinated menstruum.....	1 : 55,000	1 : 2000	1 : 800	1 : 450
No glycerin.....	1 : 50,000	1 : 2000	1 : 1000	1 : 500

This shows a slightly more rapid extraction with the glycerinated menstruum, but the difference is small. The fluidextracts are equal in value. The N. F. fluidextract has a specific gravity of 1.0725 and the other 1.0720.

It was very difficult to judge the relative stability of these samples. The fluid is so black and thick that in an amber bottle a considerable precipitate is not easily seen. Precipitation in liberal quantities had occurred in all samples, the precipitate adhering to the sides as well as the bottom of the bottles. By carefully pouring out the liquid and examining the precipitate close to an electric light the one containing 10% of sugar showed less precipitation than any of the others. In the rest the precipitates appeared to be about equal in amounts.

ASTRINGENT DRUGS.

Since glycerin is, without question, a good solvent for tannin, it is not surprising that most of the liquid preparations of the astringent drugs are made by use of glycerin in the menstruum. Hence this class is the largest in the present series.

For the estimation of relative strength and exhaustion the method of S. T. Hinsdale was adopted as being the simplest and easiest of many methods published.

It is adaptable to all the various kinds of tannin, though many methods, some of them more reliable for specific tannins, are not.

The method is given in Allen's Organic Chemistry, 4th edition, Vol. V, p. 94, and consists in comparing the colors produced with ferric chloride, using a standard solution of tannin. The reagent, which was made fresh each time since it does not keep well, consists of a solution of 0.04 Gm. of potassium ferrocyanide and 1.5 mils of solution of ferric chloride in sufficient water to make 500 milliliters; 5 mils of this reagent is mixed with 95 mils of distilled water in a colorimetric tube, then the astringent preparation—or usually a dilution of it—is added in sufficient quantity to match the color produced by adding 0.1 mil of a 0.1% solution of pure tannic acid to a corresponding dilution of the reagent in another colorimetric tube. This amount of tannic acid is enough to give a distinct, even a fairly deep blue-black color when viewed lengthwise through the tube.

Since the object sought was not an accurate estimation of the tannin, but the relative strength of two preparations of like character, the tannic acid solution was not used as a standard but was employed as a guide in determining the depth of color best suited for comparison. The estimations, therefore, were purely comparative, the whole effort being directed to ascertaining the relative amounts of the astringent preparations (of the same kind) required to produce the same degree of color.

Geranium.—The N. F. fluidextract was made and the percolates collected in fractions. Following are the colorimetric estimations:

	1st. fraction.	2nd. fraction.	3rd. fraction.	Fluidextract.
Glycerinated menstruum	1 : 33000	1 : 25000	1 : 5000	1 : 50000
No glycerin	1 : 50000	1 : 20000	1 : 1600	1 : 50000

The finished fluidextracts, each containing glycerin (one in the menstruum and the other added to concentrated percolate) had a specific gravity of 1.0775 and 1.0755, respectively.

In this case glycerin retarded extraction, but the finished preparations were of equal value.

The sample containing no glycerin has precipitated more than those with glycerin, and those containing sugar and glucose are a little heavier in precipitation than those which contain glycerin. In other words, both sugar and glucose have reduced precipitation but not as much as glycerin, and in the latter case the glycerin added to the percolate shows slightly less precipitate than the glycerinated menstruum preparation.

Hamamelis.—The fractions obtained in making the fluidextract tested as follows:

	1st. fraction.	2nd. fraction.	3rd. fraction.	Fluidextract.
Glycerinated menstruum	1 : 50000	1 : 10000	1 : 200	1 : 50000
No glycerin	1 : 25000	1 : 6250	1 : 150	1 : 42000

Here we find a very decided advantage in the use of glycerin, the first fraction (80% of drug) being twice as strong as that without glycerin, and the finished fluidextract also showing marked difference in strength. The N. F. fluidextract has a specific gravity of 1.094 and the one to which glycerin was added is 1.0895, indicating a difference in the amount of extractive.

The sample made without glycerin contained, after standing 16 months, about 12 millimeters of gelatinous, caked precipitate. The one made with glycerinated menstruum contains about 5 millimeters of a light brown, fine precipitate, and the ones to which glycerin or sugar was added contain about 3 millimeters of the same kind of precipitate. Glucose also appears to have inhibited precipitation, but the precipitate here is sticky and darker in color.

Krameria.—The fractions obtained in making the fluidextract tested as follows:

	1st. fraction.	2nd. fraction.	3rd. fraction.	Fluidextract.
Glycerinated menstruum	1 : 50000	1 : 1666	1 : 500	1 : 50000
No glycerin	1 : 20000	1 : 500	1 : 500	1 : 40000

Again a marked advantage for glycerin in the menstruum, extraction being more than twice as rapid and the finished preparation much stronger. The specific gravities did not show so much variation, being 1.059 and 1.060, respectively.

The two samples containing glycerin have deposited, in 16 months, a thin coating of precipitate on the bottoms of the bottles, that containing sugar a little thinner coating, and the one containing no glycerin about three times as much. Glucose also has hindered precipitation but not as much as the others. It may be noted again that Krameria preparations do not precipitate badly but the tannin hydrolyzed easily and the astringency may have been lost in a preparation which remains nearly or quite clear.

Nutgall.—Two tinctures were made, with and without glycerin, respectively. The one containing glycerin tested 1 : 80000 and the other 1 : 56000. Again a marked advantage in the use of glycerin.

The sample containing glycerin shows no precipitate after 15 months, while the other has a coating of insoluble matter about 1 millimeter thick on the bottom of the bottle.

Quercus.—The fractions obtained in making the fluidextract tested as follows:

	1st. fraction.	2nd. fraction.	3rd. fraction.	Fluidextract.
Glycerinated menstruum.....	1 : 33000	1 : 1000	1 : 500	1 : 50000
No glycerin.....	1 : 50000	1 : 1000	1 : 500	1 : 50000

This shows a retarding action of glycerin in extracting the drug, but the fluidextracts are equal. The specific gravities are 1.0360 and 1.0335, respectively.

Precipitation is very slight in all cases, the one in which glycerin was added in the final adjustment showing none. The others show only a slight deposit on the bottom of the bottles. Sugar again shows an inhibiting effect but not equal to glycerin.

Rhus Glabra.—The fractions obtained in making fluidextracts tested as follows:

	1st. fraction.	2nd. fraction.	3rd. fraction.	Fluidextract.
Glycerinated menstruum.....	1 : 40000	1 : 10000	1 : 500	1 : 50000
No glycerin.....	1 : 50000	1 : 5000	1 : 166	1 : 50000

Here glycerin shows a retarding effect on the extraction of the drug, but the fluidextracts are equal. The specific gravities are 1.043 and 1.045, respectively.

All of the samples show a deposit about 1 millimeter thick of a light brown diffusible precipitate which is about the same in amount in all cases. Neither glycerin, sugar nor glucose shows any marked influence on precipitation in this case.

Rose.—The fractions tested as follows:

	1st. fraction.	2nd. fraction.	3rd fraction.	Fluidextract.
Glycerinated menstruum.....	1 : 66000	1 : 25000	1 : 1000	1 : 65000
No glycerin.....	1 : 50000	1 : 12500	1 : 2000	1 : 50000

Glycerin again shows a decided advantage as a menstruum. The specific gravity of the U. S. P. preparations is 1.1565 while that containing the added glycerin is 1.1705. Apparently glycerin used as a menstruum does not add to the extractive matter in the fluidextract, though it increases the tannin.

The U. S. P. sample has deposited a thick magma in 17 months, while that containing no glycerin shows only about a quarter as much, and those to which glycerin and sugar were added, about one-eighth as much. This is an anomalous condition, but apparently sugar is nearly as effective a preservative as glycerin in this preparation.

MISCELLANEOUS.

There remain ten preparations containing glycerin, the greater portion of which owe their chief value to their flavoring qualities.

None of these contain active principles which can be estimated chemically. The only way of comparing them is by their general appearance, color and taste. The taste was compared in very dilute solutions, adjusted to be near to the limit of extension, so that any very marked differences in strength or quality of flavor

would be noticeable. Sweetened water was used as the diluent, the quantity of sugar being used equal in each pair employed for comparison. In these dilutions comparatively small differences become noticeable, and the coloring properties are also comparable, so that while the comparisons are purely physical, the results are fairly satisfactory, particularly on preparations which are employed chiefly for their physical effects.

Apocynum.—The N. F. fluidextract was made with and without glycerin. The first fractions only were compared, that made with glycerinated menstruum having a distinct bitter taste in dilution of 1 : 2500 while that without glycerin had a corresponding bitterness in dilution of 1 : 2000. The latter was also lighter in color.

Precipitation is slight in all cases. The sample containing sugar is almost clear, while those containing glycerin and glucose show a distinct trace. The sample without glycerin is fully as good in this respect as are those with glycerin.

Cardamom-Compound, Tincture of.—Tinctures made with and without glycerin were indistinguishable in taste in dilutions of 1 : 1000. In color and general appearance they are alike. The specific gravities (glycerin being added to the second) are 0.9530 and 0.9526, respectively.

None of the samples have precipitated perceptibly except the one to which glucose was added. This shows a trace of sediment on the bottom.

Cinnamon.—Two tinctures, one made with and one without glycerin, show no difference in taste when diluted 1 : 500. They are also alike in odor, but the U. S. P. tincture (made with glycerinated menstruum) is a deeper red than the other. This is in accordance with the usual superiority of glycerin in extracting coloring matters from the drugs. It is particularly noticeable in this preparation. The specific gravities are 0.905 and 0.9315.

All of the samples show just a trace of precipitation after standing a year, there being no choice in this regard except that the one containing glucose is a trifle the heavier—or perhaps the more sticky and noticeable.

Columbo.—The fluidextract was made and the fractions compared in taste in the following dilutions:

	1st. fraction.	2nd. fraction.	3rd. fraction.	Fluidextract.
Glycerinated menstruum.....	1 : 4000	1 : 500	1 : 250	1 : 5000
No glycerin.....	1 : 4000	1 : 500	1 : 250	1 : 5000

The specific gravities are 0.9495 and 0.9607, respectively.

No difference is observable here either in the rate or extent of extraction.

The sample without glycerin has precipitated considerably, those with glycerin materially less. Sugar or glucose has not hindered precipitation in this preparation, but glycerin shows some effect.

Gentian.—The compound tincture was made with and without glycerin. (It may be noted here that glycerin was introduced into this preparation in the last revision.) Both showed an equal bitterness in dilutions of 1 : 2000. The specific gravities were 0.9870 and 0.9964, respectively. In color and general appearance they are indistinguishable.

All the samples have precipitated enough to form a film about the thickness of heavy paper on the bottom of the bottles, and there is no appreciable difference in the amounts. Neither glycerin nor sugar nor glucose appears to have diminished precipitation in this.

Sarsaparilla.—The U. S. P. Compound Fluidextract was made. The reserves were compared for color, taste and odor, both as received and in dilutions (for taste particularly) of 1 : 100, and no differences were noted. The fluidextracts appeared alike, and tested alike in dilutions of 1 : 500. The specific gravities were 1.0685 and 1.0885, respectively.

The sample containing no glycerin has precipitated considerably, those containing glycerin less, and those containing sugar and glucose still less—the last almost a trace. In this case glycerin materially retards precipitation, and so does sugar, the last being the more effective.

Stillingia.—The N. F. Compound Fluidextract was prepared. This is not an easily distinguishable preparation and comparisons were vague.

The fluidextracts appeared the same, as finished and also in dilutions of 1 : 2000.

The specific gravities were 1.0952 and 1.170, respectively.

This preparation contains the largest proportion of glycerin (25%) of any in this series, and a corresponding amount of sugar and glucose was used for comparison.

The sample containing the smallest amount of precipitate is the one containing no glycerin. This shows only a thin paper-like film on the bottom of the bottle. The one to which glycerin was added contains a little more, and that wherein glycerin was used in the menstruum two or three times as much. The sample containing sugar and glucose are much worse, showing a layer of two or three millimeters of sediment on the bottom of the bottle. None of these samples have been improved, in any respect, by glycerin or sugar.

Taraxacum.—The U. S. P. fluidextract was made and the fractions tested by taste as ollows:

	1st fraction.	2nd. fraction	3rd. fraction	Fluidextract.
Glycerinated menstruum.....	1 : 800	1 : 150	1 : 40	1 : 1000
No glycerin.....	1 : 800	1 : 150	1 : 40	1 : 1000

No difference is shown here in the rate or extent of extraction. The fluidextracts had a specific gravity of 1.005 and 1.1227, respectively.

All the samples have precipitated in nearly equal amounts, showing about 1 millimeter of sediment on the bottom of the bottles. The sample without glycerin and the one with sugar appear a little heavier. Glycerin appears to have a slight retarding effect on precipitation but so slight as to be of no practical value in these samples.

Thyme.—The N. F. fluidextract was made. The taste is so mild in this preparation that a comparison of the fractions was not very satisfactory. The fluidextracts compared closely for odor and taste in dilutions of 1 : 500. The specific gravities were 1.087 and 1.0735, respectively.

Each of the samples has precipitated considerably, showing a layer of about 2 millimeters thickness on the bottoms of the bottles. Neither glycerin, sugar nor glucose shows any appreciable influence in this case.

Uva Ursi.—The U. S. P. fluidextract was made. This is another drug which is difficult to judge by physical properties because its fluidextract has no markedly characteristic odor or flavor and on dilution these are quickly lost. The fractions obtained all showed a distinct difference in color, those made without glycerin all being darker and also clearer. The finished fluidextracts likewise show a distinct difference in the same way—the glycerinated menstruum taking out less color. On dilution with water in proportion of 1 to 1000, the glycerinated preparation produces markedly less cloudiness than does the other. The odor and taste is also in favor of the no-glycerin preparation, but the difference here is slight. Neither of the dilutions has a very distinct odor or flavor. The evidence, however, distinctly points to a retarding action of the glycerin in extracting this drug.

The specific gravities of the two fluidextracts containing menstruum-glycerin and added-glycerin are 1.1085 and 1.1785, respectively, again indicating more complete extraction without glycerin.

Precipitation has occurred in all samples. The one without glycerin and the ones with sugar and glucose show about 3 millimeters of sediment, while the ones containing glycerin show a little less—about 2 millimeters. Glycerin, therefore, has retarded precipitation in this preparation.

SUMMARY.

Experiments have been conducted on 27 official preparations to ascertain the influence of glycerin on these, first as a menstruum, and second its influence on precipitation.

Final conclusion cannot be drawn from one series of experiments. Several experiments on each preparation, using different lots of drugs, are needed to establish the facts satisfactorily. The present series, however, clearly indicates that a distinction should be drawn between glycerin as a solvent in these preparations, and glycerin as a stabilizer. Sugar may act in the latter capacity quite as satisfactorily in some instances.

As a solvent, glycerin shows that it has retarded extraction in calisaya and hydrastis—two alkaloidal drugs—in rhubarb, geranium, and rose—drugs contain-

ing marked quantities of tannin and in apocynum and uva ursi. It has aided the extraction of red cinchona, butternut, hamamelis, krameria and nutgalls. The astringent drugs particularly appear to be favorable to the use of glycerin as a menstruum but they have not all acted alike in this respect. On the other drugs, glycerin shows no appreciable difference. That is, it neither helps nor hinders extraction, as shown in the results.

As a stabilizing agent, to prevent precipitation, glycerin is shown to be effective on ten of the drug preparations, *viz.*, red and yellow cinchona, geranium, hamamelis, hydrastis, krameria, nutgall, columbo, sarsaparilla compound and uva ursi. On the others it has shown no effect. And it may be remarked that in no case has glycerin been proved to entirely prevent precipitation in preparations which are prone to deposit. It is a fair inference that the value of glycerin for this purpose has been overestimated. Even in the case of cinchona preparations, in which its usefulness is unquestioned, hydrochloric acid appears to be of greater value than glycerin for stabilizing the preparations.

Sugar has been shown to hinder precipitation in preparations of calisaya, red cinchona, hamamelis, krameria, rose, apocynum and compound sarsaparilla. Its value is doubtfully indicated for butternut, hydrastis and geranium. In most instances it is shown to be less efficient than glycerin, part for part, but in two or three it appears to be more efficient.

While glycerin is found to reduce precipitation in ten drug preparations, sugar has acted similarly in nine. These correspond in six cases, and differ on the others. (Sugar was not tried on tincture of nutgalls because it is not appreciably soluble in the menstruum used.) Apparently glycerin acts by preventing changes in the fluids through light or air, rather than as a solvent.

Glucose acts similarly to sugar, but it introduces some water which changes the alcoholic strength, and it is thus less desirable.

But the fact should not be overlooked that of the 27 preparations tried, in which glycerin is directed by the Pharmacopoeia or National Formulary, only one-third of them show any advantage in the use of glycerin, while some of the others show a distinct disadvantage.

Only in the astringent drugs does it appear that glycerin is of value as a solvent, while as a stabilizer of galenical preparations the results suggest that other things may sometimes be preferable.

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ABSTRACT OF DISCUSSION.

ALBERT SCHNEIDER: Mr. Scoville's paper brings out very clearly the usefulness of the knowledge of colloidal chemistry in the study of the extraction of drugs. I would like to ask what the results of operators have been with Lloyd's reagent in making alkaloidal assays.

E. A. RUDDIMAN: I have used Lloyd's reagent in the analysis of syrups, containing alkaloids, but without success. The reagent extracts the alkaloids, but in my experience, it is a difficult matter to separate the extracted alkaloids from the reagent.

THE ASSAY OF SODIUM SALICYLATE.

BY H. W. JONES.

The method for the assay of alkali salts of organic acids given in the 9th revision of the Pharmacopoeia, while giving satisfactory results in general, is open to several objections, not the least of which is the fact that it is time-consuming and requires the most careful manipulation to secure accurate results. Again, owing to the fact that these salts are usually made by neutralizing the respective acids with alkali carbonates or bicarbonates, it is easy to conceive of a case where the method would show a salt to be of standard quality when in fact it was substandard because of an excess of carbonate. Hence, any method giving accurate results in the assay of any one of these salts would be welcome, if not open to the above objections.

Use has been made in the Pharmacopoeia of Koppeschaar's solution for the assay of certain phenols and phenolic salts. The same method is available for the assay of sodium salicylate, since salicylic acid will react with bromine and eventually form a tribromophenol; one molecule of salicylic acid absorbing in this way six atoms of bromine.

The method as applied to sodium salicylate is as follows: Dissolve 1 Gm. of sodium salicylate, previously dried at 100° C. to constant weight, in a sufficient quantity of distilled water to make the solution measure 100 mils. By means of a pipette measure 10 mils of this solution into a glass-stoppered flask of about 250 mils capacity. Add 75 mils of distilled water and 50 mils of tenth-normal bromine V. S., followed by 5 mils of hydrochloric acid. Stopper the flask and allow it to stand for fifteen minutes, shaking occasionally. Then add 10 mils of potassium iodide T. S. and titrate the liberated iodine with tenth-normal sodium thiosulphate V. S., using starch T. S. as indicator. The difference between the amounts of bromine V. S. and sodium thiosulphate V. S. multiplied by 2.667 gives the percentage purity of the sodium salicylate.

Each mil of a tenth-normal bromine V. S. used corresponds to 0.002667 Gm. of sodium salicylate.

The method is often useful for the estimation of salicylic acid or sodium salicylate in certain mixtures. It is especially of use in the presence of benzoic acid, which does not react with bromine in aqueous solution.

It is suggested that the method be included in the next revision of the Pharmacopoeia.

ON THE SOLUBILITY OF VOLATILE OILS IN MIXTURES OF ALCOHOL AND WATER.*

BY HORATIO C. WOOD, JR.

In connection with some researches concerning the antiseptic properties of the volatile oils, it became desirable to prepare solutions of these oils in the lowest possible concentration of alcohol. In the effort to accomplish this desideratum, I made some experiments on the solubility of the essential oils in different propor-

*Read before Scientific Section, A. Ph. A., City of Washington meeting, 1920.

tions of alcohol and water. Although I have tested so far only five oils, the results offer certain points of interest which have led me to present this communication.

Method.—It is apparent that the ordinary methods of determining the solubility of solids or non-volatile liquids are not applicable to the essential oils for the reason that one cannot dry the residue to be weighed, without the danger of an unknown amount of loss of the volatile oil through evaporation. I therefore, had recourse to a determination of the amount of water necessary to cause separation of the volatile oil from its alcoholic solution. There is in this method a considerable possibility of personal error, owing to the fact that, especially with very dilute solutions, the first precipitation of the oil from its alcoholic solution produces an almost imperceptible degree of opalescence. It requires considerable practice and the use of varying intensities and directions of illumination to achieve even approximate accuracy. With concentrated solutions there was relatively little difficulty in determining the point of precipitation of the oil. Fortunately, at the low concentrations of the oil which made accuracy difficult, small discrepancies in the end-point were of lesser import, for the reason that at these concentrations the solubility of the oil diminished at a rate more or less parallel with the strength of the alcohol. While the method would scarcely satisfy the fastidiousness of the analytical chemist, it has yielded some interesting results.

Various modifications, based upon the same principle, were tried. For dilutions of alcohol above 25 or 30 percent, the best results were obtained by the following:

A fairly concentrated solution (from two to ten percent) in strong alcohol (93 percent at 15.56° C.) was used as a stock solution for the experiment. To one mil of this was added a measured quantity of strong alcohol. Water was then added from a burette until the appearance of the first slight opalescence. The volume of water employed is then read, and by a simple arithmetical calculation the percentage of oil and alcohol in this mixture made. For example, suppose that one mil of 5 percent solution plus 5 mils of alcohol required three mils of water to cause turbidity. To find the percentage of oil, divide 5 (the percentage of oil originally taken) by 9 (the final number of mils); to find the percentage of alcohol, multiply the total quantity (6 mils) of alcohol by 93 (the percentage of alcohol employed) and divide this product by nine; the result of these two calculations shows that 0.555 percent of the oil saturates 62 percent of alcohol. To this percentage of alcohol corrections must be made for the shrinkage which takes place when water is added to alcohol. I have commented on the shrinkage of alcohol-water mixtures in another place. (JOURNAL A. PH. A., 1919, p. 730.) I give here a table of the corrections which must be added to the apparent percentage of alcohol.[1]

TABLE I.—SHOWING CHANGE IN VOLUME PERCENT OF MIXTURES OF 93 PERCENT ALCOHOL WITH WATER.

Expected percent alcohol.	Shrinkage percent.	True percent alcohol.
20	1.42	20.28
30	2.38	30.73
40	2.79	41.15
50	2.90	51.49
60	2.69	61.66
70	2.24	71.60
80	1.51	81.23

Since each volatile oil is a mixture of several ingredients in more or less uncertain proportions, and since it is highly improbable that all of these ingredients

[1] In all cases the strength of alcohol is expressed by *volume* percent.

will have the same solubility relations, it is manifest, first, that two samples of volatile oils may show different solubilities by this method of study, and second, that in case a volatile oil should contain small amounts of some highly insoluble substance, it would show precipitation with comparatively high percentage of alcohol, although the great bulk of the oil would be soluble in much lower proportions of alcohol. This latter fact is strikingly illustrated in the case of Oil of Cloves.

Oil of cloves requires at least 200 parts of 50% alcohol to give a clear solution, but eugenol, which constitutes 82 percent of the oil of cloves, is dissolved by less than 20 volumes of 50% alcohol. The U. S. Pharmacopoeia gives the solubility in diluted alcohol of only one oil, that of peppermint, which it states "is soluble in 4 volumes of 70% alcohol, showing not more than slight opalescence and no separation of oil globules." In my experiments two-tenths of one percent was the limit of oil of peppermint which could be dissolved in 70% alcohol without some opalescence.[1] I have been unable to find in the British Pharmacopoeia any precise definition of what is meant by the statement, for example, that oil of cinnamon is "soluble in three or four parts of alcohol (70%);" according to my results fifty to one hundred parts is nearer the truth; nor any information how this solubility is to be determined. If, however, the statements of the British Pharmacopoeia on the solubility of the volatile oils are in the same sense as that of the U. S. Pharmacopoeia concerning peppermint, then no comparison should be made with my results.

A very interesting practical problem suggests itself in this connection, namely, as to which of its ingredients the therapeutic virtues of a given oil are owing. It is very evident, for example, that if we were to make an aromatic water from oil of clove, it would contain a much larger proportion of eugenol than the oil from which it was prepared. It is not safe to take for granted that the ingredient present in the largest proportion is the most important ingredient of a volatile oil. Martindale (*Perf. and Ess. Oil Rec.*, 1910, p. 266) has found that the germicidal power of oil of cinnamon is higher than that of cinnaldehyde, and my own studies indicate that oil of clove is more antiseptic than eugenol.

The result of these studies which has struck me the most forcibly is the complete inefficiency of even relatively concentrated alcohol as a solvent for the volatile oils. None of the oils tested yielded clear solutions with one hundred volumes of 55% alcohol, while proof spirit dissolved only one or two parts per thousand. There is a sort of "critical" strength of alcohol; a certain point at which the solubility of the oil increases very markedly with only slight variations in the concentration of the alcohol; this critical point ranged between 60 percent in the case of oil of clove and 90 percent with oil of peppermint. In general, I may add, that contrary to previous assumptions, alcohol of 70 percent is not a good solvent for the majority of the volatile oils.

The results of my experiments are summed up in the following table, which shows the percentage of volatile oil required to saturate different dilutions of alcohol.

[1] Gildermeister and Hoffman state that there is a difference between the solubilities of Japanese and American peppermint oil, the latter not forming clear solutions with 70% alcohol, although both the English and Japanese do.

TABLE II.

SHOWING THE NUMBER OF MILS OF SOME VOLATILE OILS SOLUBLE IN 100 MILS OF ALCOHOL OF VARIOUS CONCENTRATIONS.

Alcohol. Percent.	Anise.	Cinnamon	Clove.	Eugenol.	Peppermint.	Sassafras.
30	0.05	....	0.02	...	0.02	0.07
40	0.08	....	0.10	0.30	0.02	0.10
50	0.10	0.20	0.40	5.80	0.03	0.20
60	0.25	0.40	2.00	16.00	0.06	1.30
65	0.80	1.10	10.00	...	0.07	2.30
70	1.50	2.20	21.75	...	0.10	4.00
75	4.00	7.00	...	...	0.17	7.00
80	7.50	....	...	...	0.35	11.00

ABSTRACT OF DISCUSSION.

In response to a question by C. E. Caspari, Dr. Wood stated that as an antiseptic, Oil of Clove was more efficient than eugenol. Answering Mr. Scoville, relative to effect of temperature on solubility, the author replied, that there was a marked difference in solubilities of oils at different temperatures. The temperatures were not accurately observed, however, within two degrees; the tests were made at temperatures between 22–25° C.

H. C. Hamilton asked relative to methods used in the germicidal tests, and results obtained. Dr. Wood replied that this work had not proceeded far enough to give definite figures, only seven oils had been determined. The phenol coefficient of oil of cinnamon is about 12, cloves about 18, eucalyptol about 1. Oil of sassafras stands very high as an antiseptic, in dilutions of from 1000 to 7000 it inhibits the growth of all organisms tested. Oil of clove is effective in dilutions of about 1000 to 6000; oil of cinnamon about the same; oil of peppermint is comparatively feeble and oil of lemon has practically no effect. The oils can be grouped, but there is a marked difference in the individual volatile oils relative to their antiseptic value.

E. H. Grant thought that different solubility results would have been obtained if the tests had been started with 70% alcohol instead of 93% alcohol. Higher results would probably have been obtained.

EXPERIENCES IN THE MANUFACTURE AND STANDARDIZATION OF DAKIN'S SOLUTION.

BY A. J. SELLS.

The early months of my services in the army were spent with Base Hospital No. 50, as bacteriologist and chemist, and in such capacity I found that the Army method for the preparation of Dakin's solution was at fault because of the materials furnished.

After a preliminary training of three months at Camp Fremont, California, the unit left for France and arrived at Mesves-Bulcy Hospital Center on August 6, 1918. This hospital center was located about one hundred and fifty miles south of Paris and was the largest hospital center in the world.

As our unit was designated a surgical unit by the Army, at least one-half of the cases were surgical and the remainder medical. These surgical cases called for a large quantity of Dakin's solution each day.

The Army method for the preparation of Dakin's solution was as follows:

Sodium carbonate (dry)	140 grammes
Calcium hypochlorite (25 percent Cl)	200 grammes
Boric acid	40 grammes
Water	8 liters

The sodium carbonate was dissolved in the water, then the calcium hypochlorite was added. The whole was thoroughly agitated and allowed to stand for about one-half hour for the calcium carbonate to settle out. Then the supernatant liquid was filtered, standardized in the usual manner, and finally neutralized with the boric acid.

This method proved satisfactory in every detail provided the materials were of the best. Then all that was necessary was to follow directions and no trouble was experienced.

However, a great deal of trouble was experienced due principally to the poor quality of calcium hypochlorite received by our medical supply. Whether it was due to negligence on the part of the medical authorities or to the untrained enlisted men handling the material I cannot say, but the fact remains that of all the lots of calcium hypochlorite received, not a single one was found which analyzed above 20 percent of available chlorine and many lots were as low as 15 percent of available chlorine. As the above formula called for at least 25 percent, a solution of the required strength could not be obtained by the above method. This proved to be a serious condition as in many cases life or death depended solely on the efficiency of this solution.

Being confronted by this difficulty I set out in the hope of producing a solution as efficient as the original with the materials at hand. First, I increased the percentage of calcium hypochlorite so that the available chlorine content would be as great as from a sample giving 25 percent of available chlorine. This I found by analyses of each lot of bleaching powder received. Such a modification proved to be as bad as in the first case as the patients complained of burning and irritation. On further examination I found that the solution contained too much caustic soda which was formed by the interaction of the sodium carbonate and the free calcium hydroxide in the bleaching powder. Now the Army formula proved to be deficient in the percentage of boric acid added.

My next step was to increase the percentage of boric acid added so that the solution was slightly more than neutralized. In this manner no further complaints were registered by the patients and the solution proved very efficient.

Embodying all the foregoing points the Army formula was revised to read as follows:

Sodium carbonate	140 grammes
Calcium hypochlorite (25 percent)	200 grammes
Boric acid	Quantity sufficient
Water	8 liters

The sodium carbonate was dissolved in the water, then the bleaching powder calculated on the basis of 25 percent of available chlorine was added and the whole thoroughly agitated. After standing for one-half hour the clear solution was filtered and titrated for strength of sodium hypochlorite.

The method of standardization was as follows:

Place 10 Cc. of solution in a flask, add 10 Cc. of a 10 percent solution of potassium iodide and 2 Cc. of glacial acetic acid. The free iodine liberated was titrated with tenth-normal sodium thiosulphate until the solution was decolorized. Each cubic centimeter of tenth-normal sodium thiosulphate used multiplied by 0.03723 gave the number of grammes of sodium hypochlorite present in the solution. I always added less water than the required amount and diluted it afterwards so that the strength would be 0.48 percent of sodium hypochlorite. After dilution the solution was again titrated so as to have a check on the dilution calculation.

The solution was now diluted to the required strength and completed with the exception of the neutralization of the solution by boric acid. This was accomplished by adding the boric acid in small portions until the solution was just neutralized. An aqueous suspension of phenolphthalein was used as indicator. When the solution was just neutralized, 2 grammes more of boric acid was added to each liter of the finished solution. The reason for this excess acid is to take care of the small amount of sodium hydroxide liberated when the solution comes in contact with the tissues. If more than 4 grammes of boric acid in excess of neutralization are present in each liter of the solution it will prove irritating. I found that 2 grammes of boric acid in excess worked satisfactorily.

During the months of November and December of 1918, twenty-five gallons of this solution were used each day. It proved to be, by far, the best solution in use for the sterilization of wounds.

When the solution was prepared according to the above modifications not a single complaint was registered by the patients, and the results were most encouraging, which was proven by the bacterial counts taken every other morning as wound controls.

Whether other hospitals experienced this same difficulty I am not able to state, but the fact is, the Army formula with the poor quality of bleaching powder received was absolutely worthless and if it had been continued would have resulted in a much greater loss of life than was actually experienced.

ABSTRACT OF DISCUSSION.

H. A. B. Dunning called attention to the very satisfactory method of preparing Dakin's solution by passing chlorine gas into a solution of sodium carbonate and bicarbonate, then standardizing carefully by the usual iodometric method, and testing for alkalinity with the newer sensitive indicators, as well as observing the phenolphthalein flash.

Ivor Griffith stated that the wane of the popularity of the solution could be ascribed to the fact that the organic chlorine compounds, such as dichloramine-T and chloramine-T, replaced it in some conditions, and also that civil practice, other than in hospitals, did not allow of its proper use.

CONCENTRATED MILK PRODUCTS.*

BY J. W. ENGLAND.

CONDENSED MILK.

Condensed milk is an evaporated milk representing about two and a half times its volume of fresh milk and containing about 40 percent by weight of cane sugar. It is of thick syrupy consistency and very sweet taste, and is marketed in cans. Commercially, it is made by dissolving cane sugar in fresh milk by a warming pan, after which it is drawn into the vacuum pan, where it is condensed at a temperature of 120° to 130° F. until the volume of liquid is 40 percent or less of the original volume; if the milk be overheated, the albumin will be coagulated and the sugar caramelized. After condensation, the milk is drawn off into cooling cans and constantly stirred in a sanitary room and atmosphere for two or three hours until a temperature of 70° F. is reached, when it is quickly canned and sealed.

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* Read before annual meeting of Pennsylvania Pharmaceutical Association, held June, 1920.

Some of the more modern canners of milk sterilize the cans with dry heat before filling them, but the cans are cooled *in vacuo* before being filled, otherwise the milk congeals. If the milk condensed be acid, a certain amount of invert sugar (dextrose and levulose) is formed. Some manufacturers use invert sugar in place of cane sugar (U. S. D. 20 Edt., 1498), because invert sugar has a less sweet taste than cane sugar and is less liable to cause sugar of milk to crystallize in the can.

According to Food Inspection Decision No. 170 (U. S. Department of Agriculture, March 31, 1917), condensed milk must be the product of the evaporation of whole, fresh, clean cow's milk and must contain at least 8 percent milk fat and not less than 28 percent total milk solids.

Condensed milk is not sterile and may contain pathogenic organisms; it is preserved against decomposition by its high percentage of sugar, which, also, prevents freezing during transportation. So long as the can is unopened, condensed milk will keep under favorable conditions for a year or two, but after several months it becomes darker in color and thicker; when the cans are opened, if kept in a cool and sanitary place, it will keep for several days.

Condensed milk was the first form of canned milk put on the market. "The early French inventors along this line, dating back over a hundred years, are said to have been called forth by Napoleon's efforts to obtain a milk that could be transported for the use of his armies. It is interesting to note that canning milk first became a successful enterprise because of the urgency in this country of feeding the soldiers of the North in the Civil War." ("Condensed Milk and Milk Powder." Otto F. Hunziker. Published by the author, Lafayette, Ind., 1914.)

During the recent World War, the demand for condensed milk was enormous. Mr. Charles E. Hires, of Philadelphia, one of the leading manufacturers of condensed milk in the country, writes me as follows:

"Following the thought expressed by you yesterday relative to the production of condensed milk in the United States, it gives me pleasure to enclose herewith the data of same:

"I do not have an accurate record of the amounts produced in 1914 and 1915, but the amounts exported were as follows:

Year.	Pounds.
1914	22,850,904
1915	75,689,584

"The amounts manufactured and exported were as follows:

Year.	Pounds.	Pounds.	Per centage exported.
1916	992,364,000	219,686,127	22
1917	1,333,787,000	428,575,213	32
1918	1,675,934,000	551,139,754	33
1919	2,030,958,000	852,865,414	42

"The number of cases of condensed and evaporated milks manufactured were as follows:

Year.			Year.		
1916	Condensed	5,931,000	1918	Condensed	10,188,000
	Evaporated	14,474,000		Evaporated	22,998,000
1917	Condensed	7,482,000	1919	Condensed	13,441,000
	Evaporated	19,618,000		Evaporated	25,720,000

"I believe these figures to be reliable. The data was compiled by the National Canners' Association of Washington, D. C."

"Milk," an exceedingly informative pamphlet, issued by the U. S. Department of Labor, Children's Bureau, No. 35, 1918, written by Dr. Dorothy Reed Mendenhall, and from which considerable data in this article have been taken, gives the following average percentage composition of condensed milk.

AVERAGE COMPOSITION OF CONDENSED MILK (HUNZIKER).

Fat	9.0
Protein	8.5
Milk sugar	13.3
Cane sugar	40.9
Ash	1.8
Water	26.5
	100.0

One of the best known brands of condensed milk, can marked "net weight 15 ounces," has upon its label the following statement: "By adding 1 part of water to 1 part of the contents of this can, a resulting milk product will be obtained which will not be below the legal standard for whole milk." Presumably, *parts by volume* are meant—not parts by weight. On examining this condensed milk, I found it had a specific gravity of about 1.26 and one tablespoonful (rounded) weighed about 350 grains. (The tablespoon is the usual form of measurement for the smaller dilutions.) Therefore, one tablespoonful of the condensed milk mixed with one tablespoonful of water represents, practically, 60 percent by weight of condensed milk; with 6 tablespoonfuls of water represents 20 percent by weight; with 12 tablespoonfuls of water represents 11 percent by weight; with 18 tablespoonfuls of water represents 8 percent by weight. With these factors the percentages of the food elements in the different dilutions when measured by the tablespoon can be readily ascertained.

But the tablespoon "heaps" when filled with condensed milk, measuring more than 240 minims (as with water). Hence, one fluidounce of condensed milk (S. G. 1.26) weighs about 575 grains and mixed with an equal volume of water represents, practically, 56 percent by weight of condensed milk, with 6 fluidounces of water, represents 17 percent by weight, with 12 fluidounces of water represents 9.5 percent by weight, and with 18 fluidounces of water represents 6.5 percent by weight.

In making condensed milk dilutions for infant feeding, the graduated measure should be used instead of the tablespoon; it is much more accurate.

Condensed milk is often useful for the feeding of infants, but it has its limitations. It "is advisable for temporary use during attacks of indigestion, for infants with feeble digestion, especially in summer, for very young infants during the first two or three months, or among the very poor when the cow's milk which is available is still more objectionable" (Holt), and also, for undernourished infants where the use of a rapidly assimilable body-fuel like sugar is indicated. In traveling, it is the most convenient as well as the safest food to use. It is usually diluted six times or more with water. But condensed-milk-dilutions are illy-balanced physiologically, containing low percentages of fat and protein and a high content of sugar, and hence, even if prepared under the best possible conditions, "should not be used as a permanent food when good fresh cow's milk can be obtained" (Holt).

The composition of human milk averages fat 3.5 percent, protein 1.5 percent, and sugar 7 percent; cow's milk averages fat 4 percent, protein 3.5 percent, and sugar 4.50 percent. The U. S. (Federal) minimum standard for cow's milk is fat 3.5 percent, non-fatty solids 8.5 percent (U. S. D. 20th Edt. 1918, 1498).

EVAPORATED MILKS.

Evaporated milk, formerly mis-named evaporated cream, is an evaporated milk representing from two to two and a half times its volume of fresh milk and containing no cane sugar. It is an unsweetened condensed milk. It has the consistency of thin cream and is much less sweet than condensed milk. It is sold in cans and in many large cities is delivered fresh daily in bulk.

Commercially, it is made by evaporating fresh milk *in vacuo* until the volume of liquid is from 40 to 50 percent of the original volume, "placing it in cans and then sterilizing the contents by subjecting the cans to steam under pressure." The temperature must be "high enough and maintained long enough to insure absolutely sterility to the product and to give the milk sufficient body to prevent the separation of the butter fat in subsequent transportation and storage." ("Milk," U. S. Department of Labor, Bulletin Publication No. 35, 1918.)

The Federal regulations require that evaporated milk must be made from whole, fresh, clean cow's milk and must contain at least 7.8 percent fat and not less than 25.5 percent total milk solids (Food Inspection Decision No. 158, U. S. Department of Agriculture, April 2, 1915). It will be noted that the standard required for milk solids in evaporated milk is nearly the same as that for condensed milk.

Evaporated milk is, or should be, absolutely sterile and will keep almost indefinitely so long as the can is unopened; once opened, however, it rapidly decomposes (but does not become at first like condensed milk—it putrefies); it should be kept well iced and used in a day or two.

Chemical Age (June, 1920, 188) states that: "As a matter of more than passing interest it should be noted that evaporated milk, part or full skimmed, modified with foreign fat or vegetable oils, has been used in increasing quantities as a substitute for true evaporated milk for home consumption. While but 12,000 pounds were tinned in 1916, more than 62,000,000 pounds of the case goods were manufactured in 1919, as shown by the following table. In 1916, the production of the

PRODUCTION (IN POUNDS) OF EVAPORATED MILK (PART OR FULL SKIMMED) MODIFIED WITH FOREIGN FAT IN THE UNITED STATES, 1916–1919.

Year.	Case.	Bulk.	Total.	Increase over previous year. Percent.
1916	12,000	14,134,712	14,146,712	...
1917	18,504	17,487,064	17,505,568	24
1918	41,033,855	7,591,182	48,625,037	178
1919	62,262,221	2,748,120	65,010,341	34

substitute compared with the production of true evaporated milk, case goods, was negligible, while the production had increased to over 5 percent by the close of 1919."

"Milk" (1918, 20) gives the following average percentage composition of evaporated milk:

AVERAGE COMPOSITION OF EVAPORATED MILK (HUNZIKER).

Fat	8.3
Protein	7.5
Milk sugar	9.7
Ash	1.5
Water	73.0
	100.0

Dr. D. R. Mendenhall states:

"From the feeding experiments recently conducted on animals it does not seem probable that either of the vitamines so far determined is injured by the high temperature. By diluting with equal parts of sterile water, evaporated milk can be reconstituted, approximately, as ordinary milk; also, it can be of great use in the general nutrition of the household and it certainly has a more tenable place in the feeding of infants and young children, when fresh milk cannot be obtained, than condensed milk. We must recognize the facts that it will freeze and is, therefore, not suitable for transportation in cold weather; that it must be carefully handled after opening the can, if it is to remain a sterile food and one fit to give an infant; and that even though condensed to one-half to two-fifths of its original bulk, it is still bulky to transport. Also, all condensed milk is relatively high in price as compared with grade A raw milk. * * * * All these reasons make evaporated milk far from the ideal substitute for fresh milk."

Dr. L. Emmett Holt (Diseases of Infancy and Children, 1916, 159) states that:

"Evaporated milk requires the same modification (for infant feeding) as ordinary cow's milk. For routine use, it should be diluted with from eight to twelve parts of water and sugar added. * * * * It is a sterile cooked milk. Some children thrive upon it who cannot so well digest either raw milk of the same percentage composition or even freshly pasteurized milk. It should not be continued as the sole food when good fresh cow's milk can be obtained."

One of the best known brands of evaporated milk, can marked "net weight 1 pound," has upon its label the following statement: "By adding one part of water to one part of the contents of this can, a resulting milk product will be obtained which will not be below the legal standard for whole milk. Presumably, *parts by volume* are meant, not parts by weight.

On examining this evaporated milk, I found that it had a specific gravity of about 1.07, and one tablespoonful weighed about 256 grains. Therefore, one tablespoonful of the evaporated milk mixed with one tablespoonful of water represents, practically, 53 percent by weight of evaporated milk; with 6 tablespoonfuls of water represents, practically, 15.75 percent by weight of the evaporated milk; with 12 tablespoonfuls of water represents 8.5 percent by weight; with 18 tablespoonfuls of water represents 6 percent by weight.

With these factors, the actual percentages of the food elements in the different dilutions measured by tablespoonfuls can be readily ascertained.

Evaporated milk does not "heap" on the tablespoon like condensed milk and, therefore, does not bulk so large. One fluidounce of evaporated milk (S. G. 1.07) weighs about 488 grains and mixed with an equal volume of water represents, practically, 51.7 percent by weight of evaporated milk, with 6 fluidounces of water it represents 15 percent by weight, with 12 fluidounces of water represents 8 percent by weight, with 18 fluidounces of water it represents 5.5 percent by weight.

In making evaporated milk dilutions for infant feeding, the graduated measure should be used instead of the tablespoon; it is more accurate.

DRIED MILKS.

Dried milk is milk deprived of its water, or the milk solids, and represents about eight times its weight of milk. It is a yellow, fluffy powder that is readily miscible with water, forming a milk-like liquid having a cooked milk taste. Dried half-cream milk is similar, but is made of milk from which one-half the cream has been removed, and is a light yellow, fluffy powder. Dried skim milk is made from skim milk and is a yellowish white, granular powder.

Commercially, according to "Milk" (1918, 21), milk powder is made by one of the following processes: (1) By feeding the milk in a thin stream over two steam-heated cylinders or drums, about one-eighth inch apart, revolving in opposite directions. The milk exposed to the heat of the cylinders dries as a thin film and comes off the revolving cylinder as a sheet, which is easily crushed into a fine powder. The cylinders which are some 60 inches long and 24 inches in diameter, are charged with steam under two or three atmospheres of pressure causing the heating surfaces to have a temperature of about 250° to 280° F. This process, known as the Just patent in the United States and as the Just-Hatmaker patent in England, is said to have been the invention of J. R. Hatmaker, of London; (2) by pasteurizing milk and then condensing in the vacuum pan, at a low temperature (130° F.) to about one-fourth its bulk, after which the condensed product is forced under high pressure through minute openings in a metal disk into a hot air chamber. The atomized liquid surrounded by a current of hot air instantly dries and falls to the bottom of the chamber as a snowy powder, the moisture rising as a cloud of steam. The mixture of the liquid and air in the evaporating chamber is stated to be about 180° F. The method was developed in France and is called there and in England the Bevenot de Neveu process. In this country it is known as the Merrell-Gere process; (3) by condensing milk to approximate dryness in a vacuum pan equipped with a mechanical stirrer.

The Federal regulations (Food Inspection Decision No. 170, U. S. Department of Agriculture, March 31, 1917) require that dried milk must contain "not less than 26 percent milk fat and not more than 5 percent of moisture." There are no Federal standards, apparently, for dried half-cream milk and dried skim milk, except that the latter "shall not contain more than 5 percent of moisture."

Dried milk and dried half-cream milk are sterile and in sealed cans keep almost indefinitely. Exposed to air, warmth and moisture, however, they slowly become rancid; dried skim milk, however, with its low content of fat, remains unchanged longer. The dried milks should be stored in a cool and dry place.

Eric Pritchard (Medical Press and Circular, Vol. 97, Feb. 25, 1914, 192–195) gives the following as the average percentage composition of the dried milks:

	Casein.	Albumin.	Sugar.	Fat.	Calories per oz.
1. Dried milk.....	24.50	1.94	38.92	28.00	146
2. Dried half-cream milk.....	30.58	2.42	39.70	15.10	119
3. Dried skim milk.....	31.40	2.49	55.00	1.00	104

The dried milks are now made upon a very large scale and find different uses according to kind. They are used in manufacturing confectionery, such as milk chocolate, baked food products and ice cream, etc., and should find a ready application for soda fountains and in the household. Their utility in traveling is

obvious. They possess many advantages—sterility, stability, convenience and cheapness.

Dried half-cream milk is used for infant feeding, more especially in France and England, being similar in such application to evaporated milk. Two ounces by weight mixed with sufficient hot (not boiling) water to make 1 pint, gives a liquid that, except for deficiency in fat, approximates the composition of cow's milk, as follows: Fat 1.5 to 2 percent, protein 4 percent, sugar 5 percent. Dried whole milk mixtures are used, also, for infant feeding, especially for infants over six months of age.

Dried skim milk is used in making bread, rolls, muffins, cakes, custards, creamed soups, sauces, cocoa and chocolate; if richer products be wished, the dried milk or dried half-cream milk is employed.

MANUFACTURING BY THE RETAILER AND ITS RELATION TO PHARMACOPOEIAL REVISION.*

BY F. W. NITARDY.

Much criticism is voiced at times against the pharmacist of to-day because he does not, as of old, make the pharmaceuticals required by him. There are exceptions, to be sure, but in general even the best of our pharmacists as a rule do not do much manufacturing, and because of this, even such radical statements as, "the average pharmacist is lazy," have been made. It has been said that unless the pharmacist makes his own preparations, he is neither availing himself of the knowledge that is his, nor practicing his art to the extent that he should, and that he is largely a dealer in merchandise, restricting pharmaceutical practice to the filling of prescriptions.

At a recent meeting where the revision of the U. S. P. was the subject of discussion, the simplification of the official processes was advocated by one of the speakers as a means of interesting the retailer in manufacturing and rescuing pharmaceutical practice from its present trend.

The object of this paper is to discuss and analyze this situation with the purpose of determining if it represents a condition detrimental to pharmacy and what, if any, change of policy should be attempted in the coming U. S. P.

To reach an unbiased opinion, let us first determine the mission of pharmacy. Broadly speaking, it is to furnish those things which the physician requires in the treatment as well as the prevention of disease. We may also include those things which the public requires in treating itself, even though we may not always believe in the wisdom of this habit. The practice of pharmacy, then, includes the gathering or production of medicinal substances, their selection, preparation, standardization, elaboration, and final compounding for use by physician and public. Whether or not, and how well pharmacy fulfills its mission would, of course, be measured by the efficiency of its service and the reliability, uniformity, and quality of the products it offers, and its progress by the improvement noted in any or all of these factors.

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* Read before Section on Practical Pharmacy and Dispensing, A. Ph. A., City of Washington meeting, 1920.

The ideal pharmacist, from one point of view, may be the man who would grow his own drugs, gather, cure, test, select and extract them; who would mine or gather the minerals required, and purify, test, select, synthesize and prepare these, then mix, compound and dispense the products so obtained. We know, however, that this is not possible, for even if any one man had the expert and detailed knowledge required to do all these things, he could not accomplish them. Expediency, efficiency and economy require specialization and restriction of the individual's activity to a narrower field. All through the ages this specialization has been going on. First, pharmacy separated from medicine, then pharmacy itself, as well as medicine, separated into specialized activities.

To-day we do not think of the many people engaged in various parts of the world in drug growing and gathering as pharmacists. We do not include the miner of coal or minerals, the workman in the gas house or chemical plant in our profession, still they serve in producing the products which the pharmacist dispenses.

If we go back over the pharmacopoeias of the last four decades—which is not going beyond the memory of many of our ablest pharmacists of to-day—we see some interesting evidence of pharmaceutical evolution. We find, for instance, somewhat over eighty products in the U. S. P. IX for which no working formula or manufacturing method is given, but for which one of the three previous editions did give a formula or process. We also find that of the products for which working formulas are given in the present pharmacopoeia, there are over eighty for which chemical assays, and ten for which physiological assays are given. None of these assays appeared in the U. S. P. VI.

While it is not necessary for the pharmacist to assay Tincture of Iodine or similar preparations if he has made them himself or knows that they were properly prepared, and the right amounts and quality of material used, there are, nevertheless, many preparations which must be assayed. Any good pharmacist can do this, but it would not be profitable. Let us take Tincture of Hyoscyamus, for example. Assuming a pharmacist makes a liter of it, he requires 250 mils for the assay and would have to run it in duplicate to be sure of his result. He could easily buy a gallon or two for what the pint he would have left would actually cost him.

Is it any wonder, then, that we find the retail pharmacist unwilling to engage in the manufacture of such preparations? Is it not reasonable to assume that the formulas or working processes which were deleted from the previous editions of the U. S. P. while the products themselves were retained, were dropped because the average pharmacist was, for economical reasons, no longer interested in having these formulas given in the official standard? Is it not in fact a continuance of the process of evolution or specialization in pharmacy previously referred to, and is it not becoming even more necessary by reason of the progress and development of pharmacy as an art and science? Does it not in final analysis lead to greater uniformity and reliability of the products dispensed, and thereby give greater and more valuable service to the medical profession and the public?

Why should a line be drawn indicating as to what the retail pharmacist should or should not do? Will not economical conditions determine this in each individual case? Wherever the retailer does start to-day, he cannot start at the very beginning or with the natural source of the products he needs. Even if he makes

his own tinctures, someone has gathered, tested, selected and ground the drugs before he used them. So does it really detract from his value as a professional man if someone also extracts these drugs? To be sure, a pharmacist has to do this work, but why should we object to some pharmacists specializing on prescription compounding, while others specialize on drug extraction, if by this system all are able to render a better service to society at smaller cost?

Where it is possible to so describe or set standards for a finished preparation that absolute uniformity in drug strength and activity is insured, and where the preparation itself is no longer commonly made by the average pharmacist, would it not be desirable to drop the formula from the next pharmacopoeia?

It is generally understood that manufacturing pharmacists who produce preparations on a large scale sometimes have to follow methods somewhat different in detail from those given in the pharmacopoeia because the pharmacopoeial process is not applicable to quantity production. Each manufacturer usually works out his own method along such lines that a finished product identical with that produced by the official method is obtained, but these processes are not necessarily always alike. Would it, therefore, not be just as well for the next pharmacopoeia to describe the finished product instead of giving a formula for manufacturing a preparation like Fluidextract of Nux Vomica? If it stated that Fluidextract of Nux Vomica is a hydroalcoholic solution of definite color representing the total extractives of the drug, containing not less nor more than a given amount of strychnine or nux vomica alkaloids and extractive matter, alcohol, etc., in amounts ranging between definite limits, would not the standard be fixed fully as well as now? Where we are unable to standardize the preparation accurately, the best standard or guide may be a formula by which it is to be prepared, and in such cases we should, of course, retain the formula, even though it is not generally used by the retail pharmacist.

Should we not, therefore, take the attitude that the U. S. P. continue in its policy of setting the highest standard compatible with market and manufacturing conditions, and one which in each case meets the medical requirements, and that it continue to standardize products, and wherever possible provide suitable assay processes? Every step in this direction is a step toward greater uniformity and reliability.

If a retailer has the time and inclination to devote himself to manufacturing along with his duties as prescription pharmacist, he should certainly do it, especially if he finds it profitable; but there is no just reason for criticism if he finds it more interesting to devote his time to dispensing problems and more profitable to buy his pharmaceuticals.

Should he be more interested or better fitted for manufacturing than dispensing, the way is open to specialize in that field. Many of our college graduates are doing this to-day.

Some day, before long, we may see a general division of the retail trade into prescription pharmacies and drug stores. Just another step in the same general direction—specialization in a given field. It is the natural trend of things, not only in our line, but in every human endeavor of to-day, and while it narrows the field of the individual, it makes him an expert, capable of rendering a greater service; and this, after all, is the only aim worth while.

FOREIGN TRADE IN PHARMACEUTICALS.*[1]

BY L. F. SCHMECKEBIER.

Let us consider for a moment the extent of our trade in medicinal and pharmaceutical preparations. The value of our exports of these articles has increased from $6,700,000 in the fiscal year ended June 30, 1914 to $19,000,000 in the calendar year 1919. As prices have increased so much in the last five years I doubt very much whether there has been a material increase in our foreign sales of this class of goods. Certain changes in the direction of our trade deserve notice. England was our best customer in both the fiscal year 1914 and the calendar year 1919, but her share of our exports dropped from 24 percent in the fiscal year 1914 to 16 percent in the calendar year 1919. Cuba was our next best customer in both years, her share of our exports increasing from 8 to 12 percent. Our trade with Brazil and Argentina did not keep pace with our total exports, as the percentage of exports taken by these countries was smaller in the calendar year 1919 than in the fiscal year 1914. The largest increase was in our shipments to Japan which were valued at only $23,000 in the fiscal year 1914 and at $1,400,000 in the calendar year 1919. Five years ago Japan took only one-third of 1 percent of our exports of chemical and pharmaceutical preparations, while in 1919 that country took $7\frac{1}{2}$ percent of the goods shipped to foreign countries.

Our main competitors in the sale of pharmaceuticals in foreign countries are France, the United Kingdom and Germany, and it will be interesting I think to review briefly the main points in their foreign trade both before the war and in 1919. The exports of prepared medicines from France amounted to 14 million pounds in 1913; 10 million pounds in 1916 and 13 million pounds in 1919. The best customers of France were Argentina and Brazil, which together took 50 percent of the exports in 1913; 28 percent in 1916, and 27 percent in 1919. Statistics of exports to other countries for 1919 are not available, but I think we may safely assume that these countries were the principal purchasers in that year, as well as in previous years. The strong hold that France has on the Brazil and Argentine markets is due largely to the fact that most of the physicians in these countries have been educated in France. This fact naturally leads them to favor the preparations with which they became acquainted during their university days.

The German export statistics show two main classes for pharmaceutical products: "prepared medicines" and "chemical products for use in the manufacture of medicine." The latest statistics of German trade available are those for 1913 in which year the exports of prepared medicines reached $5\frac{1}{2}$ million pounds, and the exports of chemical products amounted to 3 million pounds. Russia and Austria-Hungary together took approximately one-third of the total exports of each class. The remaining two-thirds were shipped to countries all over the world, no one country or group of countries showing any special predominance in this trade. From 1911 to 1913 the exports of prepared medicine from Germany increased 52 percent, while the exports of chemical products for the manufacture of medicine decreased 7 percent. The question that naturally arises in your mind

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* Read before Section on Commercial Interests, A. Ph. A., City of Washington meeting, 1920.

[1] Chief of Research Division, Bureau of Foreign and Domestic Commerce.

is regarding the competition that we are going to have from Germany in the future. Here we are dealing entirely with speculation, as there is no statistical basis from which any adequate conclusions may be drawn. At present German industry is very much disorganized due to labor troubles, the generally disturbed political situation and the lack of coal. German preparations have been excluded from the markets of the world for almost six years, and in that time it is reasonable to suppose that consumers in foreign countries have learned that the pharmaceutical manufacturers of other countries can produce medicinal preparations that are equally as valuable as the popular German products that were marketed so extensively before the war. Conservatism and the desire to adhere to old remedies will doubtless result in the Germans recovering at least a portion of their trade, but it seems likely that markets that have been won by other nations will not again be dominated by German products.

The third great competitor in the pharmaceutical field is the United Kingdom. Unfortunately the British statistics, like our own, show values only, and owing to the general rise in prices it is somewhat difficult to determine whether the increased value of exports really represents an increase in quantity. You who are familiar with the trend of prices in this industry are better able to judge this than any one else. The exports from the United Kingdom in 1913 were valued at 11 million dollars. In 1918 the values had risen to 13 million dollars, and in 1919 to 19 million dollars. The bulk of the English trade was with British possessions, which took 60 percent of the exports in 1913 and 57 percent in 1918. The remaining exports were distributed among a number of countries. Figures showing exports by countries in 1919 are not available, but there does not appear any reason to believe that the division will be radically different from the other years.

What agencies are available to assist the members of this Association in building up an export trade? The Bureau of Foreign and Domestic Commerce stands ready to render such assistance as is within its power in order to help American manufacturers to sell their goods in foreign countries. In 1914 the Bureau of Foreign and Domestic Commerce issued a monograph on South American markets for drug products, patent and proprietary medicines, and dental supplies. Although this bulletin was issued almost six years ago it is still of value to one seeking to enter that market, as it gives the basic facts regarding the trade customs. Another bulletin of this Bureau that is of interest is *Special Consular Reports* No. 76 on the Proprietary Medicine and Ointment Trade in China. This is a small publication of 12 pages, which gives the salient facts regarding the sales system and advertising in a market which is different from any other in the world. The Bureau of Foreign and Domestic Commerce likewise has published articles in Commerce Reports giving information regarding the markets in other countries, and it has also in its files lists of importers and druggists which may be obtained by the manufacturer seeking to obtain an export market.

The trade statistics of both the United States and foreign countries are generally of prime importance to a manufacturer who is selling in foreign countries. Generally by consulting our own statistics and comparing his individual sales with the total exports to a particular country he can tell whether his own sales are keeping pace with those of his competitors. The import statistics of a foreign country will also inform him regarding the quantity or the value of particular

commodities that are obtained from foreign sources of supply. The detailed statistics showing countries from which the goods are received will give him a line on the kind of competition he may expect. Unfortunately the statistical method does not offer very much assistance in the pharmaceutical industry because pharmaceutical products are generally lumped in one class and the specialty manufacturer is, therefore, unable to determine how much of his product or a similar product is imported or exported. In the case of industrial chemicals, the more important countries give detailed statistics for such individual products as sulphuric acid, caustic soda, soda ash, etc. For these commodities it is comparatively easy for the manufacturer to determine the extent of the market in each country. In the case of pharmaceuticals, however, the various products are generally lumped in some general class, and the statistics offer no guide to the manufacture of such products as asperin. The classification of our own exports is now being revised and when the new classification is put into effect our statistics will show several classes in place of the one class now known as "medicinal and pharmaceutical preparations." There are so many special products, however, that it is manifestly impossible to make any classification of imports and exports that will be of much assistance in marketing a pharmaceutical specialty.

Another direction in which the Bureau of Foreign and Domestic Commerce can be of great assistance to the exporting manufacturer is along the line of giving information on customs duties levied by foreign countries. In our Division of Foreign Tariffs we have on file the customs tariffs of practically every important country, as well as the interpretations and regulations. This information will enable the manufacturer to figure on the actual cost of these goods to the importer in foreign countries. It will also enable him to determine whether our goods are admitted on equal terms with those of other countries, because in many of the Colonies and Protectorates of France and England, goods imported from the mother country are admitted at a lower rate than those from foreign countries. The method of imposing customs duties is of prime importance regardless of the rate of duty, as there are three well defined systems in use in various countries: the net weight, the legal weight and the gross weight. With the net weight system the duty is imposed on the weight of the commodity regardless of the container. Under the legal weight system the duty is based on the weight of the commodity itself plus the weight of the immediate container, but not including the weight of the outside packing. For instance, if pills or capsules are marketed in paste board cartons the weight of the carton would be included in computation of the duty. In such a case it might be advisable to ship the goods in large boxes, allowing the importer to repack them in smaller size cartons. I do not know how far this method of computing duty will affect the drug trade, but in the case of light commodities it is important that the number of separate containers be reduced to the minimum. I remember one case that came to our attention where a dealer in South America ordered straw hats from an American manufacturer and gave explicit directions that the hats should be placed loose in a large case, simply with paper in between them. The manufacturer disregarded these instructions and placed each hat in a separate cardboard box, with the result that the duty on the cardboard boxes was greater than the duty on the hats. This importer was naturally very indignant and the manufacturer lost a customer simply because

he was not familiar with the reasons for packing the goods in this unusual manner.

The third method of levying duties is the gross weight system, under which the duty is calculated on the total weight of the commodity and all packing without any allowance for tare. Where the gross weight system is employed it is important to make the packing cases as light as is consistent with safe transportation. This involves nice discrimination and judgment on the part of the packing room, because if the case is too light, there is likely to result damage, and if it is too heavy the importer is compelled to pay additional duty.

Closely allied to the question of tariff regulations is that of the "Pure food and drug laws" of foreign countries. Unfortunately the Bureau is not equipped to give specific advice on the laws of various countries which regulate the sale of pharmaceutical preparations. I think the Bureau of Chemistry of the Department of Agriculture has done some work along this line, but I do not believe even that organization is prepared to give detailed information. If the members of this Association are going to make a determined effort to sell larger quantities of their products in foreign countries, I think it would be well to take some steps to make available to its members the Drug Regulations of important countries. Many of these are already on file in the original language in the Bureau of Foreign and Domestic Commerce and in the Bureau of Chemistry. There remains the work of translating and publication, and I believe it would be worth your while to have a competent man translate the important sections of the Drug Regulations and have them printed for the benefit of your members.

Owing to the large number of products marketed by the pharmaceutical industry and the fairly limited market for some of them, I think it might be well for exporting manufacturers to consider the possibilities of forming an export combination under the provisions of the Webb Act. This Act allows competing concerns to combine for the purposes of promoting their export trade. Organizations of this character generally have a central office in the United States and a single agent in each foreign country representing all of the members. By means of a common agent in foreign countries the overhead expense of marketing is much reduced, and it is thereby possible for several manufacturers to have representation where otherwise there would not be enough business for each manufacturer to have a separate representative. The administration of the Webb Act is vested by law in the Federal Trade Commission, which will be glad to furnish all necessary information regarding methods of incorporation.

There is also another line of activity in which the Bureau of Foreign and Domestic Commerce can be of assistance to the manufacturer of pharmaceuticals, and that is, in indicating sources of supply for raw materials that are purchased in foreign countries. Our Annual Report entitled *"Commerce and Navigation"* gives detailed statistics showing the country of shipment for a number of raw materials that are used by the manufacturing pharmacist, and a separate table giving imports entered for consumption shows figures for imports for some materials not shown in the general import table. The statistics of import for consumption do not show the countries of origin. This information is also published monthly and quarterly in the *Monthly Summary of Foreign Commerce* and in the *Quarterly Statement of Imports Entered for Consumption*. These statistics

enable you to ascertain what quantities of certain materials are being brought into the country.

Another publication of the Bureau which will be of interest to you is our *Miscellaneous Series* No. 82 entitled "Chemicals and Allied Products used in the United States." After the outbreak of the war in Europe and the cessation of exports from Germany and Austria-Hungary, many chemicals and chemical materials were very difficult to obtain in the American market, and it seemed desirable to ascertain definitely where we obtained the bulk of our chemicals and chemical materials prior to the war. Through the coöperation of the American Chemical Society funds were raised to make an examination of the consular invoices for all imports during the fiscal year ending June 30, 1914. The results of this work are shown in our *Miscellaneous Series* No. 82 which gives figures showing the quantity and value of the imports of 2500 separate classes of products, and the percentage of the total quantity imported from each foreign country. These 2500 products include all those whose import value during the year ending June 30, 1914 exceeded $100. The remaining 3,000 products which were valued at less than $100 each during the year are shown in a separate list without figures showing the quantity and value of each commodity.

THE MEDICAL DIVISION OF THE NATIONAL MUSEUM.*[1]

BY CHARLES G. MERRELL.

Those of you who have kept in touch with the proceedings of the American Pharmaceutical Association will recall that some years ago an effort was made to bring about the establishment of a national pharmaceutical museum at Washington, where material bearing upon pharmaceutical history might be collected and deposited for future reference.

The Historical Section of the American Pharmaceutical Association has, for years, busied itself with the collection of historical material of various kinds, and it was largely with a view to providing a permanent home for such material that the movement for a national depository for matters of historical interest from a pharmaceutical standpoint was carried on.

This end has at last been achieved through the enlargement of the field of the Smithsonian Institution, which now, under the name of the National Museum, has established a very interesting medical division, which includes much matter of interest to pharmacists.

This medical division is located on the south side of the gallery in the East Hall of the Arts and Industries Building of the Museum. The subjects illustrated are grouped under four heads, namely:

(1) History of Medicine.
(2) Materia Medica.
(3) Pharmacy.
(4) Sanitation and Public Hygiene.

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* Read before 1920 Meeting of Ohio State Pharmaceutical Association.

[1] This paper has interest, aside from the matter presented, because of the desirability of enlisting the coöperation of the American Pharmaceutical Association, state associations, and the drug trade, in the efforts of the Smithsonian Institution to add to its pharmaceutical exhibit.

Three alcoves are devoted to the history of medicine, starting from the beginning of medicine in India, Egypt, Greece, Rome, China, and among the Hebrews.

Two alcoves are devoted to the history of medicine in America, which is illustrated by biographical sketches, portraits, etc.

Three alcoves are devoted to materia medica, and two to pharmacy, including both modern and historical pharmacy. It was through the efforts of Mr. F. L. Lewton that the section of pharmacy was established.

Several of the leading manufacturers of the United States have contributed material illustrating the lines in which they are interested and the products they prepare.

Many of the members attending the meeting of the American Pharmaceutical Association and of the delegates attending the Tenth Decennial Convention for the revision of the United States Pharmacopoeia at Washington in May took the occasion to visit the National Museum and see the display of articles of medical interest which has been organized there in the Medical Division under the supervision of Mr. F. L. Lewton, curator, and of Mr. C. Whitebread, the assistant curator of that division.

Through the courtesy of Mr. Whitebread I am able to present a photograph of one of these displays which will give an idea of the pains which the museum authorities have taken in the preparation of the exhibit.

The still shown in the accompanying illustration is used for the distillation of the oil from the bark of the *Betula lenta*, the black, or sweet, birch which abounds in the mountains of the Carolinas, eastern Tennessee, Kentucky, and some sections of Connecticut and Pennsylvania. In Connecticut the oil is obtained from the twigs of the small birch bushes, the supply of trees having been exhausted.

The still used in the Carolinas is about 8 or 10 feet long and about 4 or 5 feet high and about the same width. The still is made of wood, except the bottom, which consists of sheet iron. Between 8 and 9 inches from the bottom is a false bottom of wire mesh or perforated sheet iron.

The distiller buys the bark privilege from some lumber company, and under this privilege cuts down the birch trees, paying a stipulated sum for each tree used. These trees run up to as much as 10 or 12 inches in diameter.

When the tree is cut down the buyer removes the bark by beating the trunk and the larger branches with a maul, and carries the bark thus obtained to the still in baskets.

The bark is laid on the false bottom of the still, about 40 bushels constituting a charge, and the cover is fastened on with wedges as shown in the illustration.

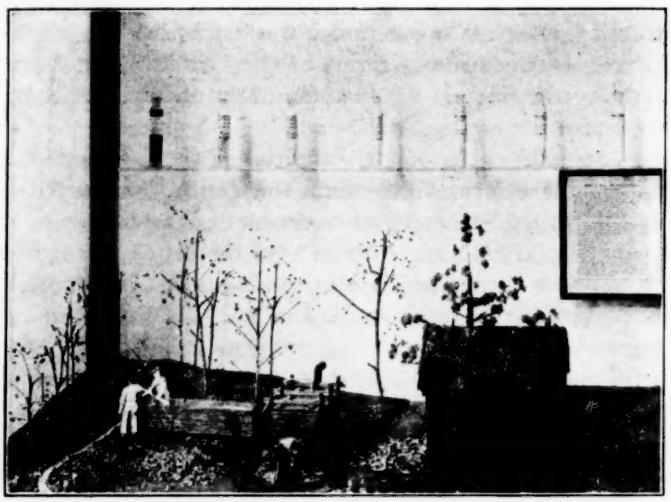
The outlet of the still is an ordinary gas pipe, generally from $^1/_2$ to 1 inch in diameter and about 10 feet long. This is encased in a long box or trough through which a stream of water flows, condensing the mixture of steam and oil which comes off. The bark is first steamed for about 12 hours, as the oil does not exist in the bark as such, but as a glucoside which is hydrolyzed by the steaming and thus yields oil. The heat is then raised sufficiently to insure distillation, which goes on generally for about another 12 or 14 hours, making 24 to 28 hours to run a charge.

One ton of green bark will usually yield about three pounds of oil. The bark which has been distilled serves as fuel for the next charge.

The distillate, consisting of a mixture of oil of birch and water, is collected in a funnel placed in an ordinary Mason jar placed on a hollowed receptacle. The oil of birch settles to the bottom and the milky mixture of oil and water overflows the jar and passes down through the receptacle beneath the jar into a small pipe which leads into the still below the water level.

The apparatus is, therefore, in the nature of a continuous reflux still, though in a very crude form.

In the bottles above the model are shown samples of the oil and its derivatives, natural salicylic acid in large and in small crystals, and the sodium, lithium, strontium and magnesium salts of that acid.



Distilling Birch Oil in the Carolina Mountains

The illustration shows a model of a North Carolina still in operation which is exhibited in the Division of Medicine of the National Museum at Washington. The exhibit was prepared under the supervision of Mr. C. Whitebread.

This type of still is used in the mountains of the Carolinas, where it is generally set up temporarily and moved when the supply of birch trees is exhausted.

In Connecticut, however, the industry is on a more permanent basis. The stills are larger and more effective than that shown in the illustration, and each distillery has a warehouse in which it stores the twigs and brush which are used for distillation, these plants being quite extensive and representing considerable investment.

This particular exhibit interested me for the reason that such great difficulty has been experienced in obtaining pure birch oil that we have found it necessary to purchase and operate our own stills. I was also interested from the therapeutic point of view, for I am firmly convinced that better therapeutic results are obtained from the natural acid and its salts than are obtained from the use of the synthetic product, and my belief is shared by a large number of practicing physicians. I am in receipt of a note from Mr. Whitebread on the subject, who writes:

"The Museum desires to have the state pharmaceutical associations advised of its efforts to collect articles bearing on the history of pharmacy in the United States and appreciates very much your coöperation in presenting the matter to the Ohio Pharmaceutical Association at this time. The task of collecting proper material relating to pharmacy is an immense one when placed in the hands of one or two men, but if all pharmaceutical associations will bear in mind our efforts and do their bit by calling to the attention of the Museum information where historical material can be obtained the task will be an easy one and it will not be long before we shall have a national collection which will be worthy of the subject which it represents."

In order to make a beginning in this direction I would suggest that a committee on National Museum Exhibit be appointed by the Ohio State Pharmaceutical Association, whose object it shall be to coöperate with the Museum authorities in collecting suitable material to add to the pharmaceutical exhibit.*

CINCINNATI, Ohio.

COMMITTEE REPORTS

REPORT OF THE COMMITTEE ON REORGANIZATION, A. PH. A., 1920.†

Your Committee on Reorganization sent a circular letter to one hundred leading members of the Association in which the following three propositions were presented for consideration in connection with a paper read by your chairman before the Association at its last annual meeting and entitled, "Shall we reorganize the American Pharmaceutical Association?" This paper was published in the March (1920) number of the JOURNAL:

1. Shall we reorganize the American Pharmaceutical Association and make it a commercial body presided over by a House of Delegates composed of representatives of the manufacturers of "proprietary" medicines and commercial druggists, acting as their agents and antagonistic to the medical profession; or

2. Shall we reorganize and make it a delegate body of pharmacists and manufacturers pledged to practice the vocation of pharmacy in compliance with professional and scientific requirements, and in accord with the medical profession; or

3. Shall we retain the present form of organization with or without minor changes for improvement?

About fifty replies have been received to this circular letter, some of which have been handed to the chairman of your Committee during the present session of the Association, and many excellent suggestions have been presented in these replies, and also presented by others in conversation with members of your Committee. An attempt to discuss these suggestions during the limited time at our disposal is impractical. Your Committee therefore recommends and moves that the Committee on Reorganization be continued for another year and that it shall, in the near future, place in the hands of the Editor of the JOURNAL a digest of these suggestions, and that the Editor be requested to publish the same in the JOURNAL with a request that the members of the Association give the subject careful consideration in the light shed therein in the aforesaid paper on reorganization published in the March number of the JOURNAL, also in the light of the suggestions made in the digest of replies to the circular letter, and in the light of the points brought out in the discussions in the pages of the JOURNAL which will probably occur as the result of such publication.

Your Committee requests the privilege of adding to its membership individuals belonging to the Association who are specially interested in the subject of reorganization, the names of such individuals to be presented to the Council and approved.

(Signed) S. L. HILTON,
JULIUS KOCH,
F. E. STEWART, Chairman.

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* Such a committee was appointed by the Ohio Association.

† Read in General Session of the Association, Washington meeting, 1920; accepted and recommendations approved.

SECTION ON EDUCATION AND LEGISLATION, AMERICAN PHARMACEUTICAL ASSOCIATION.

ABSTRACT OF THE MINUTES OF THE SESSIONS HELD IN THE CITY OF WASHINGTON, MAY 7 AND 10, 1920.*

The first session of the Section on Education and Legislation, A. Ph. A., was convened by Chairman Clair A. Dye, Friday, May 7, at 2.00 P.M.

While the Chairman read his address, Secretary Edward Spease presided.

ADDRESS OF THE CHAIRMAN OF THE SECTION ON EDUCATION AND LEGISLATION.

By Clair A. Dye.

In the introductory of his address, Chairman Dye gave an historical résumé of the work of this Section from its inception. Admitting slow progress, he clearly pointed out that suggestions for higher standards which had been considered visionary and highly impractical in the past, and legislation which was deemed impossible of enactment, had been established. There are now, as in the past, those impatient because of delays and fearful that nothing will be accomplished, and others who consider contemplated promotions impossible or against the best interests of pharmacy. Many of the rank and file are more or less indifferent, while a few enthusiasts "carry on." Referring to adoption of prerequisite laws by sixteen states and the advancement in college requirements, he said:

"It is of course natural that we should take pride in these achievements since they have occurred in our time, and many of us have had a part in their accomplishment. Let us not, however, stop here simply because we have successfully achieved the goal in our own state, but rather let us give of our experience and enthusiasm in order to aid the workers in the other states where the struggle for higher standards is now on or the campaign is just beginning. We all know how much a word of encouragement or a suggestion at the right time helps when one is discouraged and about ready to give up a seemingly hopeless task."

He referred to the views of legislators who attributed efforts of pharmacists in behalf of adequate legislation to selfish motives, and to the time-worn argument, that education was not open to the "poor boy." Commenting, he said:

"If it is prejudicial to the best interests of such a boy to say that he cannot enter pharmacy without attaining certain educational requirements, it surely must be nothing short of criminal to permit him to go on in a poorly prepared way to the point where he finds all avenues to further advancement closed, because he lacks the necessary preparation and training. Surely it is better that he should encounter his difficulties at a time when he can easily overcome them, than in later years when he is otherwise handicapped.

"Let us therefore not let such an argument go unchallenged, but face the facts and let it be known that, as a rule, the real danger lies in too low standards rather than in no standards at all. The opportunities for the poor boy, providing he has the right spirit, to work his way through school and college, were never better. Let us be real honest and point out to him the advantages of a sound training and the fact that many of the best men ever graduated from college have worked their way through and, in so doing, have builded a better and broader foundation than could have ever been obtained had they gone through on the low standards some would have us believe are best for pharmacy."

The question, within reasonable limits, he said, "is not how low shall we make our standards, but rather how high." He dwelt at length on the necessity of education for progress, that a grammar school education did not qualify the prospective pharmacist to grasp the fundamentals of a technical training, let alone intelligently apply them. Discussing these subjects, he said:

"We must not expect that the simple enactment of pre-requisite laws alone is going to elevate the practice of pharmacy, for no profession can be elevated artificially above the level of the educational standards and ideals of its average members. The foundation or basis of a prerequisite law should be a sound preliminary secondary school education upon which may then be builded the necessary technical training.

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* Papers with discussions will, hereafter, be printed apart from the minutes. It is understood, unless otherwise stated, that the papers were referred to the Publication Committee.

"If we are honest in our efforts to advance pharmacy, we must realize that the greatest development comes from an enlightened and sympathetic public sentiment and a membership possessing the training sufficient to place it on an equal basis with any other calling. To measure up to the standards expected of us by the public and the other professions, to which we are allied, we should remember that our relation to these and the public is unique in that the service we render is both technical and professional as well as commercial."

He further urged careful and conscientious consideration of the preliminary education of those wishing to enter pharmacy by colleges of pharmacy and proprietors of drug stores, and contended that the standards of pharmacy were held down by admitting those without sufficient preliminary education, who became opinionated that pharmacy has no educational standards. They are not interested in organizations or concerned in movements that advance pharmacy. Well trained young men take cognizance of these conditions and, as a result of conclusions drawn, not infrequently, enter other ranks, although the opportunities in pharmacy would otherwise have appealed to them. There is then the dual handicap, and an unfortunate feature of such conditions is that frequently a candidate is permitted to appear before State Boards of Pharmacy for registration with no other qualification than indifferent practical experience and a most elementary preliminary education, which is ofttimes given the same weight, if not the preference, by the Board as that of one who has had a high school and college training. Concluding his arguments on these points, and referring to the value of business training, he said:

"The standing and attractiveness of any calling is, in a large measure, due to the attitude and training of the men engaged in it. We, therefore, can never hope to attract many well trained men so long as our educational standards and ideals are so low, and we ourselves are apologetic of the work we do.

"In opposition to the arguments for higher standards there are many who would have us believe that all such standards are unnecessary for the reason that the practice of pharmacy, at the present time, is so largely commercial. There is no denying that the latter is, in a great measure, true. The very nature of the business is sufficient, in most instances, to partially account for this and, therefore, we would not ignore or neglect this feature of the training. A business training and judgment are most essential in the successful development and conduct of any pharmacy, even an ethical one. There is no argument against a business training and its application in pharmacy.

"We do, however, regret that in many instances the spirit of commercialism has been so strongly developed that little room has been left for true pharmacy. As a result the energies of the organization are devoted to problems of merchandizing, as related to a stock of a most varied character, rather than to the development of the prescription department and the maintenance of a creditable stock of sick room supplies. To find some excuse for this varied stock we hear the argument that there is no longer much, if any, demand for drugs and supplies. Yet we find such stores still clinging to the term pharmacy and making capital out of their prescription department for the reason that this feature gives a prestige and dignity to their business which can be gained in no other way. In most cases of this kind the prescription department, and the equipment for carrying on the work, are most woefully inadequate; as a rule, the men in charge are unqualified or poorly prepared to undertake the most elementary phases of the work.

"For these and various other reasons, which will suggest themselves to you, we feel that there is much to be said against commercializing of the term pharmacy, rather than to the application of sound business principles in the solution of the business problems of the average pharmacy.

"Granting, however, that the conducting of the present day pharmacy is a business proposition, is this any valid reason against a better preliminary education or higher standards? Surely none can deny that all modern commercial activities are demanding educated, college trained men and, in many instances, highly trained technical men for all kinds of positions, from clerks to general managers.

"The demand for college trained men by the big business and manufacturing firms is keen, they are constantly sending out their representatives to the various schools and colleges to present the advantages of their various lines of business to the students and, especially, to pick from the senior class the more promising candidates. Should commercial pharmacy lag behind the other commercial interests and refuse to recognize the value and efficiency of educated and trained men?

"Admitting that there are exceptions to all rules, we are still of the opinion that none of you, who are practical pharmacists, would be so short-sighted or even willing to place your business on a lower level and accept less trained help than is demanded in other lines of business. Competition is too keen to warrant our experimenting with poorly trained and inefficient help. Viewed, therefore, from either the purely commercial or technical side of the question, are there really any valid reasons or arguments for continuing the low standards under which pharmacy has been laboring and handicapped in the past?

"Some would have us believe that all the higher standards for which we are pleading, such as graduation from high school and a college of pharmacy, as a preliminary to the practice of pharmacy, are incompatible with good business practices. There can be, however, no incompatibility between a good basic educational training, good business management and the observance of the best professional ethics. All these combined in their proper order make the essential constituents of the one specific necessary to the cure of incompetent help troubles and poor business success."

Readverting to the need of advanced education, and summarizing, he said:

"If those who have studied the question, from every point of view, find it necessary to demand at least a preliminary education equivalent to high school graduation before beginning the study of agriculture, dentistry, veterinary medicine and the other lines, then a thing so fundamental cannot help but be of the greatest value to those taking up the study of pharmacy. There can be no question as to which of the foregoing groups of subjects is right, since no true efficient education can be built upon a poor foundation and expect to withstand the demands of present-day competition.

"If any further argument is needed to convince the skeptical regarding the necessity of raising the standards in pharmacy, we may recall the experiences growing out of the efforts to secure recognition for pharmacy in the Army and Navy and the establishment of S. A. T. C. units. These experiences have been so recent, that it is unnecessary to recall the difficulties and rebuffs encountered by those interested in presenting the claims of pharmacy to those in authority.

"Many reasons have been given to explain why we failed, but none have come nearer the truth than the statement that 'the educational requirements of pharmacy are generally so low that we have no place among highly trained men.' It is of course true that many pharmacists occupied places of trust and requiring high technical skill, in the Army and Navy, but these came as the result of individual merit and training and were not general and representative of a class, as in medicine, dentistry and veterinary medicine. The same was also true of the establishment of the S. A. T. C. units, since only those schools demanding high school graduation for admission were granted units.

"In view of the foregoing statements it is again evident, that the great stumbling block to the recognition of pharmacy and the establishment of a pharmaceutical corps was the lack of educational standards.

"The war is over, or practically so, at least, but we should not let up in our endeavors to secure the recognition that pharmacy deserves to have, as an essential part of the technical and medical organization of the Army and Navy. Let us profit by our experiences of the past and redouble our efforts, but in so doing let us realize, at the outset, that some of the hypercritical methods and criticisms indulged in by some enthusiasts, and the belligerent attitude of others toward those in authority, will never bring us very much. Let us get at the basis of the whole question, namely, the educational standards of the men available for appointment in a pharmaceutical corps. We hold no brief for any group or class and do not wish to be understood as saying anything in disparagement of the general ability of the pharmacists as a class, but it is evident from past experiences that it is useless to try and include every registered pharmacist, regardless of his preliminary education and technical training, among those available for appointment.

"In this instance we cannot expect to hope that the well qualified, technically trained men can carry through the poorly qualified and inefficient, since the latter far outnumber those whose preliminary education and training would entitle them to the recognition we are seeking. Why not recognize the facts and profit by past experiences and unite upon a new campaign for recognition, based upon educational standards sufficient to command the recognition we should have.

"Enough has been said, we feel, to convince the most skeptical that what pharmacy needs most of all is a new vision of the future, based upon reasonable educational standards, and a recognition of the value of service to our fellow-men. Ignorance and selfishness, while not always boon companions, often go hand in hand. Neither should have a place in our creed, but in their place we should find education and equity.

"We have long been striving to achieve this goal, and our efforts have been rewarded in fifteen different states by the enactment of prerequisite and other laws which already have had their effect upon the practice of pharmacy. We believe such laws are just, since society at large is the chief beneficiary of wise laws, which tend to educate its public servants. To the latter class the pharmacists surely belong, for we know of but few groups of men that are called upon to render any greater or more varied service than the pharmacists. Indeed we may even say that no man engaged in a public business, of the type conducted by the pharmacist, really works for himself alone. Granting these facts, no charge can be made that such laws are urged for purely selfish reasons.

"It is, therefore, hoped that those of you from states not already having prerequisite laws, will not only realize their importance, but will visualize the position pharmacy is sure to occupy in the future.

"We believe there has never been a time so favorable for the enactment of such laws as the present. The war has taught the people, as they have never been taught before, not only the necessity, but the advantage of education and technical training, and this applies as fully to pharmacy as to any other line of work.

"We trust that you will carry home with you the resolve to preach the gospel of higher standards for pharmacy in your own state, and that you will not rest until your efforts have been crowned by a prerequisite law second to no other. This will mean hard work, but no reform has ever been accomplished by sitting back and lamenting over conditions as they exist.

"A just cause backed by public sentiment, enthusiasm, a good organization, unity of workers and hard work are some of the essentials necessary to carry on a winning campaign for the enactment of prerequisite laws in the various states still without them. Even so, much help may be gained through the aid and advice of those who have already passed through such a campaign."

Coöperative Work for Prerequisite Legislation.

"We feel that this aid, however, could and would be of greater force and value if it emanated from some central bureau representing the A. Ph. A., the N. A. B. P. and the A. C. P. F. I, therefore, recommend that this Section urge this Association to appoint a committee to confer with a similar committee from the other associations named, with the power to select and employ a National Organizer, whose duty it shall be to help the various state organizations in their fight for such legislation. Such a bureau would not only wield a great force, but would be of inestimable value in offering suggestions, planning the work and otherwise aiding state committees in carrying out their campaign. We believe the Association could do no greater piece of constructive work, advance pharmacy more rapidly, or spend the money more wisely, than in adopting this plan.

"In considering the question of a campaign for prerequisite legislation, we wish to call attention to the scarcity of registered pharmacists, since this fact will be used as one of the strong arguments against any form of legislation of this character. It seems to be useless to discuss a situation which is so patent to all, except to point out what appears to be the real reason for the scarcity. Prior to the war the supply of high class men had commenced to decline, largely on account of the low wages and the fact that the general conditions and the low standards required had discouraged young men of good training from taking up the study of pharmacy. Then, during the early part of the war, when the United States was furnishing large quantities of supplies to the Allies, help became scarce, wages were rapidly advanced and, as a result, many young men in pharmacy, and others, who possibly would have later entered pharmacy, were attracted to these other lines on account of the higher pay. A further decrease resulted after we had entered the war, when practically all the available young men were called to the colors. As a result the number of men in pharmacy, at the close of the war, was greatly reduced. Other reasons might be given to explain the scarcity, but these are sufficient to show that the decrease

in the number of men, after all, has not been due to higher standards, but rather to a combination of circumstances, not likely to obtain again for a great many years.

"Although greatly to be desired, it is hardly probable that we will have a universal prerequisite requirement in all states within the next few years. In lieu of this we do feel that the State Boards could help matters very greatly by demanding not only high school but college graduation of all candidates seeking reciprocity. Such requirements seem to be as little as could be exacted of any candidate under such conditions, and they would help the cause very materially.

"We urged this question in a report read at the joint session of the N. A. B. P., the A. C. P. F., and this Section, at the Chicago meeting of this Association. At that time some said that this was impossible, but even so, some of the states have at the present time either such requirements or, at least, demand high school graduation as a requirement for reciprocal registration. It is also reasonable to assume that if the Boards have the power to grant reciprocal registration they surely have the power to say under what conditions this may be granted. At the same time such requirements would make a certificate of this kind mean something worth obtaining, and would in no way affect the requirements or work any hardships on any one in their own state, but would materially raise the standard of those seeking registration in states other than their own."

Publicity.

"One of the things which organized pharmacy needs now and has needed for a long time, is greater publicity in what it is and is not doing, and what it is aiming to do. Practically every other form of social, religious, educational and business activity is far and beyond pharmacy in this respect. For a long period, either through indifference or modesty or the mistaken idea that it was unethical, we have neglected the opportunity of letting the public know what we are doing and our ambitions for the future. As a result of this neglect pharmacy has suffered greatly and has been credited with doing many unethical things, and with rarely a word about the humanitarian, progressive and scientific things pharmacists are doing. Scarcely a day passes, but that we read or hear something more or less against the good name of pharmacy; even the advertisers of some of the products we sell accuse us of substitution and other unethical practices. Many of the articles appearing in the lay press recently relative to various pharmaceutical preparations, and practices and activities, would never have appeared and others would have been answered long ere this, if we had a strong publicity bureau.

"We are entitled to and should demand a square deal in all that pertains to pharmacy, and should have a chance to defend ourselves and our good name in the same public manner as our motives are questioned.

"We are glad to recall to your minds that steps were taken last year toward the formation of such a publicity committee, and that the committee has been appointed and is showing signs of life. Let us hope that it will soon reach the active stage and that we may soon see some of the fruits of its labors. We should remember, however, that the task before the committee is no easy one, and without the hearty support of all the members of the Association it can do but little.

"The past year has been a most remarkable and, in many ways, a trying one for pharmacy. We have had many things to contend with and yet we feel these have been met and overcome with credit to the profession. The numerous restrictions exacted by the narcotic rulings, and especially those resulting from the enforcement of the Federal prohibition law, have been met by the great majority of pharmacists with a willing spirit of coöperation which has elicited most favorable comment from those engaged in the enforcement of the laws."

Awakening of Pharmacy.

"An awakened spirit of interest in things pharmaceutical is evidenced by a greater spirit of coöperation among the pharmacists. This is particularly noticeable in the renewed activity and interest in state and local associations, where the memberships have increased, and many reforms and constructive measures have been inaugurated. As a result we find the working conditions and hours for the clerks have been greatly improved. The hours are more reasonable and the pay of clerks has been increased to meet the growing demands of the times. The pharmacist has at last come to a realization that he is not only entitled to, but actually needs, some relaxation and relief from his exacting duties.

"From the many and perplexing experiences of the past few years we have emerged broader and stronger, and with a greater realization of our obligations as public servants. These experiences have taught us many things and, I am sure, we have learned our lessons well. We have practiced economy, and from the lesson have adopted new and more rational business practices. We have worked in harmony with our neighbors in patriotic and philanthropic drives, and found that we had not only many things in common but, in so doing, we could work with greater efficiency. Through all these coöperative efforts we have learned the one great unselfish lesson of service to our fellow-men.

"From these numerous lessons, we are sure, pharmacy has emerged with new ideals and a greater realization of the value of service. With this new vision has come the recognition of the fact that as pharmacists, in all our relationships to the people, in habits, customs, traditions, health and well-being, we have a prominent and intimate part. To meet this new obligation we must have a new and broader vision of our responsibilities and a greater realization of the fact that, after all, the supreme test is our ability to render to humanity an adequate and intelligent service based upon the broad educational standards of the present progressive age."

F. J. Wulling moved, seconded by C. E. F. Mollett, that the address of the Chairman be received and the recommendations take the usual course.—Carried.

ABSTRACT OF DISCUSSION OF CHAIRMAN'S ADDRESS.

F. J. Wulling, in commenting on the address, stated that recently he was present at an assemblage of 2300 high school students. The opportunity was afforded him to question the students relative to further schooling and their choice of vocation. Four hundred expected to continue their studies; ten were going to study medicine, ten contemplated teaching, thirty had selected dentistry, one hundred or more had chosen engineering, about the same number decided to enter business pursuits, and only three pharmacy. He then invited those who were willing to write him relative to whether they had considered pharmacy as a profession to be followed by them, and if so, why they had not selected this course. Thirty letters were received; their main reason for not taking up pharmacy was, "the standards were not sufficiently high." One said if he could qualify for pharmacy he would take up dentistry; two had thought of pharmacy, but determined on studying medicine; another wrote, if he could have qualified for pharmacy he would not have chosen medicine; the father of one had advised his son to study pharmacy, because it was profitable; he had conferred with three other young men and, as a result, all four had decided to go into pharmacy. The speaker said that recently he had the honor of representing Montana in a convention of college men. He was impressed by their dignity, poise and insight, which was the result of broad, general training in addition to their technical training, and pharmacists needed more of that broader cultural training to fit them for professional work. He believed that pharmacy would awaken to provide higher standards. Some years ago he had acted on the conclusions that unless higher standards were fixed by pharmacists some one else would enforce such provisions. Associations can do much in bringing about better conditions, and every successful effort encourages others.

Charles E. Mollett complimented the Chairman on his address and concurred in the views of the preceding speaker. He did not think pharmacists as citizens opposed high school education, but in the demands for pharmacy this certainly was the position of some of them. Continuing, he said that high school students studied the various occupations open to them, and they realize what it means to become proficient in the branches underlying pharmacy. They know the educational requirements for pharmacy are not high enough to prepare students for comprehending the essentials of the sciences. As a result they turn aside from pharmacy. There are many pharmacists now in business who fail to realize that to advance the educational requirements of pharmacy raises their own standing. Long hours and insufficient pay constitute other reasons for keeping young men out of the drug business; there has been considerable improvement along these lines.

The speaker wanted the Section to define Commercial Pharmacy. In his opinion the subject did not include things entirely foreign to drugs. The druggist is the distributor of many articles. His business is complex, but the several divisions are dependent on each other. He contended that if the standards were raised those now in the business would have credit for what the young men gain under advanced requirements; retail pharmacists should be convinced that the object of higher education is to supply them, not with fewer clerks, but with those better

qualified, and after all the purpose is to supply the public with better service; other less important professions than pharmacy have higher educational standards.

W. C. Anderson, referring to the remarks of Mr. Wulling, stated that evidently the lack of higher educational standards did not keep the young men out of pharmacy; the largest number of the four hundred students referred to had chosen commercial pursuits, and business had no such standards.

A. W. Linton contended that the young men entering business courses would pursue studies for from two to four years, and not simply a short business course.

Louis Emanuel said that pharmacy should be built on a foundation "from the ground up;" if Montana had no prerequisite law, now was the time to prepare for one.

L. L. Walton did not think higher standards of education had prompted the young men—that better remuneration in other lines was an important factor.

C. E. Mollett and E. T. Motley were appointed members of the Committee on Chairman's address.

Secretary Edward Spease read his report.

REPORT OF THE SECRETARY.

Section on Education and Legislation, A. Ph. A.

By Edward Spease.

There seems to be no set standard or method of procedure for the work of this Section and much of the success of its work depends upon the response it receives from the members of the Association.

After all, everything that is discussed and all papers that are read in all the Sections of the Association have to do directly or indirectly with Education and Legislation, hence the attempt in this report will be to bring to the attention of the Section some observations that may be worth discussing even in this brief session.

A short questionnaire was sent out to the Boards of all of the forty-eight states and one was likewise sent to the Conference Schools. The results of the returns with some few comments will be recorded here, but a tabulated series of statistics will not be given. The reasons for not giving these statistics are to save time and space and likewise because the questions asked and answers received were not entirely satisfactory. An attempt will be made, however, to incorporate a set of questions to serve as a guide for succeeding years that will bring in some detailed information, either to this Section or to the Conference.

It seems as if a detailed report of the condition of schools, as received by the Chairman of the Executive Committee of the Conference, should be published each year, or that a similar report should be worked out in conjunction with the Boards and published, preferably in the Conference and Boards reports, or as part of the report of this Section. In this way much time of all people concerned could be saved.

The series of questions went to forty-five Conference schools. Of these thirty-two replied with the information requested and one replied referring us to the Executive Committee of the Conference and to its State Board. We did not have access to Conference figures and "its State Board" was too busy with an examination to give us information.

FROM THE SCHOOLS.

Total students enrolling in 32 conference schools, 1st year	2,474
Total students enrolling in 32 conference schools, 2nd year	1,224
Total students enrolling in 32 conference schools, 3rd year	172
Total students enrolling in 32 conference schools, 4th year	52
	3,922
All other students enrolled	160
Total students enrolled in 32 conference schools	4,082
Total number of high school graduates	2,167

It may be interesting to note that the University of Minnesota, the University of Mississippi, and Purdue University have an enrollment of 100 percent high school graduates.

FROM THE BOARDS.

Twenty-three out of forty-eight Boards replied to the "Board Questions." One of this number, as stated above, reported nothing.

The questions asked of the Boards were perhaps not as satisfactory as they might have been and this fact is in part responsible for the lack of replies. There are some interesting things, however, to be drawn from these reports.

Arkansas.—The Board requires a minimum of two years of high school and four years' experience.

Connecticut.—Plans are under way looking to legislation requiring high school graduation.

Idaho.—The committee appointed by the Commissioner in the Department of Law Enforcement can define educational requirements. (See report of Secretary, this Section, for 1919.)

Illinois.—The Department of Registration and Education has now a set of requirements to which a school must conform before it will be approved by the Department. There is nothing in these requirements to which a proper School of Pharmacy should not conform.

Indiana.—Candidates for examination for Registered Pharmacist License must be graduated from a recognized College of Pharmacy, unless registered in Indiana as an assistant or apprentice before January 1, 1920.

Kentucky.—Board has the right to fix academic and professional requirements. Prerequisite requirements will be fixed by the Board before July, 1920.

Montana.—A motion was made to increase educational requirements, but was tabled. Reason given, "conditions not warranting adoption."

New York.—Two forms of registration—Druggist and Pharmacist.

A candidate for Druggist examination need not be a graduate of Pharmacy school.

A candidate for Pharmacist examination must be a graduate from a registered School of Pharmacy, requiring two years of high school for entrance or the usual equivalent as determined by the Board of Regents. "The State does not reciprocate with other states in the matter of exchange of licenses for the practice of pharmacy, although provision is made in Section 233 of the law for such exchange providing the State Board in question is registered by the Board of Regents as maintaining standards equal to those in force in this State. At present no State Board is so registered."

It does seem to the casual observer as if reciprocity should be extended at least to those states that exceed New York in the matter of educational requirements.

Ohio.—Since the report of the secretary of this Section last year, the laws were amended to increase fees for registration and to increase fines for conducting a drug store without a license.

Pennsylvania.—The Board has ruled to the effect that in 1919–20, and 1920–1921, two years of high school shall be required; in 1921–22, 1922–23, three years of high school; and in 1923–24, and thereafter, 4 years of high school shall be required. This is likewise required by the schools for entrance.

South Carolina.—Provision has been made for annual renewal of licenses and an annual appropriation for defraying expenses of the Board.

Texas.—Agitating prerequisite law and seem to be determined to pass such a law soon.

Virginia.—Four years of high school goes into effect April 1, 1922.

FUTURE REPORTS.

As stated earlier in this report, it is the intention here to state a few questions that may be used either by the Conference and the Boards or by future secretaries of this Section. These suggestions are derived from the results observed this year.

FROM THE SCHOOLS.

Correct Name of School.
Number of students admitted to first year class..... .....
Number of students admitted to second year class..... .....
Number of students admitted to third year class..... .....
Number of students admitted to fourth year class..... .....
All other students admitted..... .....

Total students admitted..... .....
Number of high school graduates in 1st year class..... .....
Total number high school graduates in all classes..... .....

Does the School require high school graduation for entrance in case of students desiring degrees?.....
Upon what conditions may special students be admitted? .....
(Of new Students Only.)
Name.....Date of birth.....Class Standing.....
Secondary or Preliminary Education:
Extent in months.
In units or counts (space to define unit or count).
In what School obtained.
Is the school accredited (by whom)?
Admitted on Certificate from high school only?
Admitted on Certificate from State only?
Admitted on both High School and State Certificate?
Admitted by Examination?
By Whom Examined?
Of a total number of .... students registered at the opening of the preceding year ..... number remained throughout the year.
At the close of the preceding year:
.... were graduated with the degree of Ph.G.
.... were graduated with the degree of Ph.C.
.... were graduated with the degree of B.S.
Other degrees and their number were ....

All of the above questions could not be asked by the Secretary of this Section, but should be brought together into one place for a detailed report. A duplicate blank should always be enclosed for filing with the school.

FROM THE BOARDS.

State of .....
Number examined for Pharmacist for calendar year of ....
Number examined for Assistant Pharmacist for calendar year of ....
Number examined for ..... for calendar year of..... .....

Total number examined..... .....
Of the above, Pharmacists passed..... .....
Of the above, Assistant Pharmacists passed..... .....
Of the above, ... passed..... .....

Total passed examination..... .....
Number from within State registered without examination..... .....
(State if upon diploma or how, omitting reciprocal registering.)
Number registered by reciprocity..... .....
Is N. A. B. P. plan followed?..... .....
New laws affecting pharmacy since last report..... .....
Board rulings raising educational requirements in addition to or in place of above laws..... .....
Unsuccessful attempts to raise educational requirements..... .....

EDUCATIONAL ARTICLES.

It is the desire of the secretary of this Section to voice an approval of and to call attention to the article, "The Teaching of Therapeutics," of Dr. Hobart Amory Hare, appearing in the *Journal of the American Medical Association* of February 7, 1920.

A few more such articles will go a long way towards the upbuilding of proper professional pharmacy. It is beginning at the right place.

NARCOTIC LEGISLATION.

The provisions of the recent amendments to the Harrison Law are sufficiently known to the profession to necessitate no further comment in the report. Reference to United States

Internal Revenue Regulation No. 35 and to the *Pharmaceutical Press* will give all the information available.

It might not be amiss to mention that all narcotic records have been turned over to Prohibition enforcement officers and that they will have the future enforcement of laws relating to narcotics.

PROHIBITION.

It is not the purpose of this report to go into detail in regard to prohibition legislation. It is merely the purpose here to call attention to one or two specific things that have occurred that should not be lightly passed over.

It was realized by many of us that prohibition would cause untold hardship to the pharmacist and such has been the case. The traffic in intoxicants reported in the daily press as involving the names of pharmacists is placing us in an unenviable position in the eyes of the public.

Can it be true that any of the recent thefts of alcoholic liquors have been made with the knowledge of the pharmacist in question? Can it be true that some pharmacists are prostituting their calling by selling alcohol to dealers for the purpose of illicit traffic and then reporting these liquors in the numerous ways possible to cover up their usage? Can it be true that certain types of druggists have made immense fortunes in the illicit traffic in intoxicants? Is it true that a permit to obtain liquors may be had by anyone owning a drug store, be he former saloon keeper or otherwise?

If these things be true, what are we as professional pharmacists going to do?

I wish to approach another angle that has been brought to my attention in the public press.

In the issue of January 24th of the *Saturday Evening Post*, under the caption of "Small-Town Stuff," by Mr. Robert Quillen, appeared a few paragraphs of great interest to me.

The paragraphs referred to are headed "Kicks."

Mr. Quillen says "few people outside of the retail drug business realize to what an extent patent medicines have replaced more orthodox bottled goods as the favorite beverage" and "But the sale of patent medicines containing a kick is legitimate, and it is none of the druggist's business whether the medicine is purchased by one foolish enough to think it is a remedy."

Mr. Quillen is correct in his attitude and in what he wishes to bring before the public, but he is not sufficiently informed upon this subject. He, like many other well-meaning individuals, sees only the retail drug store because it is in a fixed place of business.

Does he know anything about the large number of grocery and general stores handling these noxious wares and has he any figures upon the number of wagon vendors in the rural districts and the house-to-house canvassers in the towns and cities? Does he know of the number of mail order houses pushing this business?

The Proprietary Association filed a brief with the Anti-Saloon League of Ohio stating that there were 40,000 general stores and 10,000 wagon men handling these products, no doubt leaving the inference to be drawn that they should be given more consideration in drafting a prohibition bill than should 2,500 druggists.

Does he know that the druggist has had this business foisted upon him by advertising and subsequent public demand and that the druggist is used as a cloak of respectability for this business?

It is but fair to the legitimate druggist to bring out these facts to the public.

Does the public know that the druggist has tried time and again to put this business under the control of state officers, by license to sell, by permit, and what not, and has always been defeated by an efficient patent medicine lobby.

The patent medicine men have always claimed that these methods would limit distribution of their commodities and that the druggist wants the business.

Mr. Quillen's "perhaps the druggist is careful not to make it his business" is a line I take strenuous objection to. I observe he says "Perhaps." Do you think such a statement should be made? The druggist is licensed under the laws of his state. Take all medicine business out of the hands of those who sell for the dollar only and then revoke the license of him who prostitutes his profession.

It is time for all "fake" medication and "cure-alls" to go.

In the issue for February 14th of the *Literary Digest* appeared, under the heading "Prohibition and Proprietaries," some statements that are, to say the least, interesting.

"Patent medicines, which their own makers more properly term 'proprietaries,' since practically none of them are patented or patentable, have often been mentioned in connection with the fight for prohibition. It has been charged that many of them were used more freely as beverages than as medicines, and it has even been said of late that some State-prohibition legislation has been so framed as to favor this use. Against these statements the makers of 'proprietaries' have always protested. Mr. E. T. Kemp, representing the 'Proprietary Association' with headquarters at Chicago, and editor of *Standard Remedies*, asserts that only about one so-called 'patent medicine' in four contains alcohol at all, and if any of those which do contain alcohol are 'fit for beverage purposes' they become, automatically, intoxicating liquors under the definition of the Prohibition Enforcement Act, and their manufacture and sale are prohibited. As the prohibition law is to be enforced by the Revenue Department, by whom permits for the use of non-beverage alcohol are granted, the probability of the misuse of medicines as substitutes for alcoholic liquors is very remote, Mr. Kemp thinks, and likely to be followed by the immediate revocation of permits. The Proprietary Association, representing about 80 percent of the output of so-called 'patent medicines' in the United States is on record, he says, as in accord with the strictest enforcement of the prohibition enforcement law, and its attitude on that subject has been communicated to the Prohibition Commissioner. Mr. Kemp writes further:

"'No prohibition law, State or National, has been written by, for, or in the interests of the manufacturers of 'patent medicines.' Any statement to the contrary is false and ridiculous. It is well known that the prohibition enforcement bills have been written by the Anti-Saloon League, whose sole purpose is to destroy the lawful manufacture and sale of alcoholic beverages, in which purpose it has succeeded. It is up to the Revenue Department to destroy the illicit manufacture and sale.

"'The National Prohibition Enforcement Act contains a definition of 'intoxicating liquor,' as do most State laws, and these definitions are of approximate uniformity. The National Act, in its definition, among other articles (including beer, wine, whiskey, etc.), mentions: 'Liquids or compounds, whether medicated, proprietary, patented, or not, and by whatever name called, containing one-half of one percentum or more of alcohol by volume which is fit for beverage purposes.'

"'If a product, of any kind, character, or nature, contains more than one-half of one percent of alcohol and is 'fit for beverage purposes' it is an intoxicating liquor and can not be made or sold in the channels of trade. The definition is certainly no concession to any one.

"'It seems to be the deliberate intent of the anti-patent medicine propagandist to create an impression that patent medicines, per se, are alcoholic compounds, and, upon this false impression, to attempt to destroy the business of manufacturing and selling such medicines.

"'Such medicines differ in no material particular from the medicines prescribed or dispensed by physicians, except that they are frequently advertised to the public and are sold as articles of merchandise to druggists. They constitute perhaps 60 percent of the drug business in the United States.

"'As determined by the Commission on Proprietary Medicines of the American Pharmaceutical Association, only 27.79 percent of patent medicines contain in excess of one percent of alcohol. Of United States Pharmacopoeia galenicals 48.24 percent and 47.65 percent of the National Formulary galenicals contain more than one percent of alcohol.

"'Alcohol for manufacturing can be obtained only on permit granted by the Department of Internal Revenue after it has satisfied itself that the alcohol is to be used in the manufacture of non-beverage preparations. These permits may be revoked, and the manufacturer's bond, equal to $4.20 for each gallon of alcohol used, may be forfeited if misuse is made of the alcohol so withdrawn.

"'Under these conditions fear that 'patent medicines' will supply the alcohol addict with his tipple is groundless. The contingency is too remote to give even the antipatent-medicine propagandist any hope or joy.'"

I am sure that the *Digest* wishes to present news to its readers and does not wish to endorse "patent medicines" and as I have been a constant reader of it I could not overlook this article.

It was an unpleasant duty of mine to be a self-appointed advisor to the Anti-Saloon League in Ohio on medicines until I was completely routed by the "Patent" medicine interests.

There is considerable doubt in my mind if the Anti-Saloon Leaguers had any thought of medicines, toilet preparations, and the like being affected by prohibition until they started to draft bills.

Perhaps it was the original purpose to draft a model bill in Ohio and to carry it to Washington as a basis for federal legislation. Hence, those in Ohio who are familiar with facts know all about the whole nauseous business.

We, no doubt, must agree with Mr. Kemp that "no prohibition law, state or national, has been written by, for, or in the interests of the manufacturers of 'patent medicines' as, of course, the Leaguers did not have this fact in mind as the paramount issue." A fence may be built to keep the cows out of the cabbages but with holes enough in it to let the pigs into the garden. Does the Volstead bill do this? I agree that "it is up to the Revenue Department to destroy the illicit manufacture and sale" and, we Ohioans look to "Honest John" Kramer to do this.

The phrase "fit for use for beverage purposes," as found in Title II, Section I, of the Volstead Act, is the "joker."

Who is qualified to decide what is fit for use for beverage purposes?

My personal opinion is that any alcoholic preparation that is non-toxic, when taken internally, can be considered as fit for use for beverage purposes. Leave out of the question the physiologic action of alcohol on the system and any alcoholic preparation not containing a poison will be considered as a beverage by some.

Who is wise enough to decide that one preparation may be sold and another may not be.

Mr. Kemp, in speaking of "proprietaries," says that "they differ in no material particular from medicines prescribed or dispensed by physicians, except that they are frequently advertised to the public and are sold as articles of merchandise *to druggists*."

It would seem that the physician should be equipped with knowledge sufficient to enable him to know when any certain medicine should or should not be used and, furthermore, when the physician prescribes properly he knows what is in his medicine.

Does any one know what is in the majority of widely advertised proprietaries, when he takes them?

Mr. Kemp further states that "proprietaries" constitute *perhaps* 60 percent of the drug business of the United States," but he does not say that this 60 percent goes through the channel of men qualified to know about drugs.

He compares the alcoholic content of "proprietaries" with the legitimate medicines of the United States Pharmacopoeia and National Formulary (the legal standard for legitimate medicines), but he neglects to state there is no standard for proprietaries. He further neglects to point out that the complete quantitative amounts of each ingredient in U. S. P. and N. F. preparations may be known to any one, but that the formulae for proprietaries is not known to any but the maker.

It seems as if the time has come for professional pharmacy to cut loose and away from all medicines whose formulae are not open to the public and that a publicity committee should be appointed to throw a little light upon all articles that are written in the public press coming from proprietary interests.

Before leaving this subject, let me call your attention to an article in the *Literary Digest* of January 31st, 1920, entitled "A Salesmanship Scheme That Sells The Farmer Medicine He Doesn't Want." It is worth reading.

THE NATIONAL FORMULARY.

An editorial recently appeared in the *Bulletin of Pharmacy* on the above subject and numerous ones were asked to express their opinion in regard to it.

This editorial appeared in the February *Bulletin*, and both the March and April Journals have carried comments upon it from men who, for the most part, are well known to pharmacy.

I think the *Bulletin* should be congratulated upon opening up this discussion as much good must eventually come from it and by the reading of the articles written the druggist who reads the *Bulletin* will begin to learn not only "Why is the National Formulary," but "What is the National Formulary."

It is not my purpose to repeat anything that has been written anent this editorial, but I should like to comment just a bit, hoping, perhaps, that we may have a discussion here about this all-important subject. This book being "law" and likewise being used in educational institutions should properly be discussed in this Section.

We are told by this editorial that the "fate of the National Formulary hangs in the balance." If this be true, then it should be discussed here.

I would suggest that we find out first the facts relative to this statement and then, if this be true, the discussion should begin.

I cannot help but call your attention to the article by Otto Raubenheimer. He says it as he thinks it. I should like to clap my hands when Mr. Raubenheimer laughs, especially when he is gentlemanly and does not ask—Why were those particular eighteen U. S. P. and N. F. preparations blacklisted *first* by the Prohibition Commissioner? Mr. Raubenheimer also does not ask who suggested these eighteen preparations?

Why were not a few of the "fake" proprietaries selected as horrible examples?

This matter is perfectly pertinent to a discussion of the N. F. I want to ask, if the N. F. be abolished, will the Government take it up and publish it?

I further want to ask, would not its abolishment help the manufacturers of proprietary medicines to the detriment of real pharmacy?

Were many proprietary remedies included in the N. F. or have many proprietaries been copied from the N. F.?

I look at the protective value of the N. F. more than to the therapeutic value of its preparations. I shall leave the discussion of therapeutic values to men capable of discussing them—but, let us retain what few little scraps of authority we now have.

Today, a National Formulary preparation must conform to the standards laid down therein, but does a proprietary have to conform to standards?

Let us discuss—and then let us retain the National Formulary.

Charles H. LaWall moved, Charles W. Johnson seconded, that the report of the Secretary be received and published. Carried.

ABSTRACT OF DISCUSSION ON SECRETARY'S REPORT.

C. B. Jordan called attention to the "jokes" passed on pharmacists in connection with the effect of the prohibition law. He hoped the Section would take some action relative to this matter.

Charles H. LaWall spoke along the same lines and referred to a number of popular weeklies that disseminated such insinuations through illustrations and "joke columns." He referred to some denaturing methods which were permitted under the law, and not effective.

C. O. Lee hoped for the widest possible publicity relative to the attitude of pharmacists on this question.

C. B. Jordan concurred in the suggestion, and moved that the attention of the Drug Trade Board of Public Information be drawn to this matter, in an endeavor to stop these references in the press, and also to educate the public relative to the attitude of pharmacists on this question.—Carried.

Earl R. Serles called attention to the stringent prohibition law of South Dakota.

Ambrose Hunsberger stated that the prohibition officer in Philadelphia welcomed suggestions and criticisms on prohibition law enforcement from pharmacists.

W. C. Anderson moved that this Section request the Commissioner of Internal Revenue to refer proposed new regulations for dispensing alcohol to a committee, one of whom should be a pharmacist. Louis Emanuel seconded the motion.—Carried.

The following papers were read:

"Experimental Pharmacodynamics for Students of Pharmacy," by R. A. Bliss.

"Some Observations Relative to Training in Drug Analysis," by C. O. Ewing. (See p. 586, June issue, JOURNAL A. PH. A.)

"How to Overcome Indifference Concerning Need of Sterilization," by A. W. Linton. (See p. 589, June issue, JOURNAL A. PH. A.)

"Need for Regulation of the Exportation of Narcotics" by A. W. Linton. (See p. 801, August issue, JOURNAL A. PH. A.)

"Pharmaceutical Requirements," by H. B. Smith.

The Chairman appointed the following Nominating Committee: Albert Schneider, Charles O. Lee and Earl R. Serles.

The session was then adjourned.

SECOND SESSION.

The second session of the Section on Education and Legislation, A. Ph. A., was called to order by Chairman Clair A. Dye, May 10, at 2.30 P.M. Charles O. Lee acted as Secretary *pro tem.*

The following papers were read:

"The Chain Store System. Legislation to Prevent Its Growth," by F. H. Freericks.

"A Minimum Four-Year Pharmacy Course," by F. J. Wulling.

The Nominating Committee reported the following nominees for officers for the ensuing year:

Chairman, Edward Spease, Cleveland, Ohio.

Associates, A. W. Linton, Seattle, Wash.; Philip Asher,† New Orleans, La.; C. F. Walker, Richmond, Va.

Secretary, W. H. Zeigler, Charleston, S. C.

They were elected.

C. O. Ewing presented a report for the Committee on Chairman's Address, commending the adoption of the recommendation that a National Organizer be employed jointly by the American Pharmaceutical Association, the National Association of Boards of Pharmacy, and the American Conference of Pharmaceutical Faculties, to further the work of promoting the passage of prerequisite laws, and endorsed the formation of a joint committee for this purpose by the bodies mentioned.

The report was accepted and approved.

THE FAIRCHILD SCHOLARSHIP.

Chairman E. G. Eberle made a brief report for the Fairchild Scholarship Committee, stating that there were no applicants this year.

The decision reached at the New York meeting was that the Fairchild Scholarship should be awarded on the basis of a competitive examination to candidates who are high school graduates, and who have successfully finished their first year's work in a school or college of pharmacy, or department of pharmacy of a university, member of the American Conference of Pharmaceutical Faculties, and that each school, college or department of pharmacy be allowed and be limited to two candidates. A letter bearing on these matters was sent to the Schools and Colleges of Pharmacy by the Chairman on March 24, 1920. The limit of two applicants from each institution was deemed advisable, in order to keep down the total number of applicants and, as far as possible, select candidates who had made good records during their first year in a pharmacy school. The manner of nominating the candidates by the schools is left to the respective institutions.

The Fairchild Scholarship Committee, under the provisions of the donor, consists of the presidents of the American Pharmaceutical Association, the American Conference of Pharmaceutical Faculties and the National Association of Boards of Pharmacy, and the Editor of the JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION as Chairman. The Examination Committee is selected by the Fairchild Scholarship Committee.

The hope was expressed that during the present year, under the new provisions, quite a number of applications would be presented for this scholarship.

The following papers were then read:

"Unification of Pharmaceutical Education," by C. B. Jordan.

"Pharmacy and the New Education," by C. O. Lee.

Jacob Diner moved, John C. Wallace seconded the motion that all papers not read be read by title and referred to the Publication Committee.—Carried. They are:

"The Next Step in Pharmaceutical Education," by R. A. Lyman.

"Non-Secret *versus* Secret Remedies," by George E. Ewe.

† Deceased, July 5, 1920.

"Educating the Public through Enforcement of Postal Legislation," by L. F. Kebler.

"The Tariff and the Crude Drug," by E. E. Stanford.

The Chairman announced that the recommendation of this Section to appoint a committee to confer with Revenue Department officials relative to the exportation of narcotics was referred to the Council, and the following members were appointed as such committee: Charles H. LaWall, Chairman; Charles W. Johnson, Acting Chairman; A. W. Linton, Cornelius Osseward and Clair A. Dye.

The session was then adjourned.

JOINT SESSION SECTION ON EDUCATION AND LEGISLATION, A. PH. A., WITH AMERICAN CONFERENCE OF PHARMACEUTICAL FACULTIES AND THE NATIONAL ASSOCIATION OF BOARDS OF PHARMACY.

A Joint Session of above named bodies was called to order immediately following the conclusion of the final session of the Section on Education and Legislation, A. Ph. A., by Past-President Wortley F. Rudd, of the American Conference of Pharmaceutical Faculties. After preliminary remarks by Chairman Rudd relative to the value of these joint meetings for the discussion of matters that have interest for all, and being convened for specific purposes, other affairs do not enter. Secretary H. C. Christensen presented the report of the National Association of Boards of Pharmacy. Referring to his report of 1913, he was gratified that many of the proposals of that period had become realities. There had been progress in the methods for determining the fitness and qualifications of candidates before State boards of pharmacy, and this year he hoped to witness the consummation of a plan whereby there will be a logical relation between the courses of pharmacy schools and the examinations of the boards. He looked forward to the time when all these candidates would be college of pharmacy graduates.

Further extracts of the report by Mr. Christensen for the Advisory Examination Committee are quoted:

"Is it not possible that, five years or ten years hence, we shall put the candidate into a well equipped laboratory and give him a practical problem in assaying, or synthesis, or manufacturing, or testing for purity or strength, or microscopic identification? It is one thing to know that an applicant knows certain facts. It is another thing to know whether he can apply what he knows."

TWO KINDS OF PHARMACISTS.

"Now, just to project our view into the future a little further. Graduation as a prerequisite for full registration is going to produce in this country two distinct classes of pharmacists. One may be designated roughly as proprietors or managers, the other as clerks. Or, to make another classification, we will have the registered pharmacist and the assistant. The prerequisite may decrease the number of registered pharmacists. We must not overlook the needs of the proprietor and the public that there shall be a sufficient number of pharmacists duly licensed in some way to carry on the work. The shortage of pharmacists of both classes during the acute epidemic of last year and the year previous brought this matter quite forcibly to our attention. We must take cognizance of these conditions.

"This supply of qualified men must come largely from the ranks of the assistants. We must, therefore, always keep in mind the needs of this group and the examinations fitting to them, which will, of necessity, differ substantially from the registered pharmacist examination.

"Furthermore, your committee thinks it important that in States where there is no such group as the assistant steps should be taken, legislative or otherwise, to create such a class.

"Hitherto, we have looked upon assistant registration as but a transient thing; something which would last for a few years only; that it was merely a stepping stone to full registration. This has been the case in most of the States. I think that we must now consider the assistants in a distinct class. They will, in the near future, be about of the same grade as our present registered pharmacist, but the rank and file of them will remain as assistants. Or, better still, call them registered druggists and the higher group registered pharmacists.

"Call them what you will, it is a class we are creating and we must take them into full consideration in our examinations of the immediate future; yes, even of the present. As matters now stand, we generally look upon assistants as 'apprentices' only, men who will remain in this class for a few years only and then pass on. That condition will not long prevail."

PHARMACY BOARD ADVISERS.

"Coming back now to our immediate and present needs, our problem seems to simmer down to this: a plan which will make effective, thoroughly effective, principles of examination which we have tested and found sound. The plan proposed last year by John Culley to divide the States into districts, with a vice-president in charge of each district, these vice-presidents constituting the advisory examination committee, should be tried out. We can never tell just how a thing will work out until we have tried it, but this plan has all the ear-marks of a successful one. These men will function as supervisors, in an advisory capacity, of course, and, because their districts will be small as compared with the present arrangement, increasing benefits should result."

The report was accepted.

The report of the Committee on Examination Questions was presented by Chairman E. A. Ruddiman.

Secretary Theodore J. Bradley (chairman of the Syllabus Committee) stated that this report will be worked out in permanent form and printed in the Syllabus.

A motion was made and carried by vote that the report be accepted. It was then discussed, many participating in the discussions.*

L. L. Walton read a paper on "Practical Experience Requirements for Pharmacy Licensure." In introducing his subject the speaker referred to the views of others on the subject of drug store experience, and spoke of the relative value of different kinds of experience. The concluding division of the paper is printed in full and relates to

A SYSTEM OF UNITS.

"Thus we have one year's actual pharmaceutical work in a retail drug store where physicians' prescriptions are compounded under supervision of a pharmacist, as our standard, arbitrarily fixed as sixty units.

"The number of *practical experience units* required for admittance to the examinations in any State may be such a multiple of sixty as the number of years of practical experience required by law. In Pennsylvania this would be 120 practical experience units for the assistant pharmacist examination and 240 for the pharmacist.

"The number of practical experience units to be credited for pharmaceutical work performed in hospitals, the Army Medical Department, the Hospital Corps of the Navy, or other places, should bear such ratio to the standard as the character of the work justifies. In no case should experience rate equally with the standard because it does not include all the essentials of retail drug store experience, unless 60 to 120 units have been earned under the conditions of the standard.

"The total number of practical experience units necessary to admittance to the examinations could not be earned outside of the retail drug store and the applicant could not be qualified in all the essentials without having had retail store experience. Therefore, in the establishment of such a system, 60 to 120 practical experience units, acquired under the conditions laid down for the standard, should be made a prerequisite.

"This would assure some measure at least of actual contact with all the details of the retail drug business upon the part of a candidate for license and would permit of a greater ratio of credit for specific kinds of pharmaceutical experience acquired under other conditions.

"Under this prerequisite there could be allowed safely equal credit of 60 units or 120 units for one or two years, respectively, of experience gained in hospital dispensaries, properly conducted and managed by pharmacists, and in the hospital corps of the Army or Navy, under supervision of pharmacists, and for a one or two years' satisfactorily completed course in a recognized college of pharmacy.

"For pharmaceutical experience acquired in a manufacturing pharmaceutical or chemical laboratory, in a wholesale drug store, or other place, the system would permit of credit allowance in practical experience units, according to the character and variety of the work performed and time of service, even though such credit would be necessarily small."

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* It is hoped to print this report in full, with discussions thereon, in a succeeding issue of the JOURNAL.

The paper was accepted.

Chairman W. F. Rudd referred to the report of the Committee on Drug Store Classification (see JOURNAL A. PH. A., November, 1919, p. 982). He stated that this was a matter which should be thoroughly studied by the Boards, schools and individuals; the Committee has been continued, and it is hoped some definite, final action may be taken at the next annual meeting. There being no further business for the joint session, the meeting was adjourned.

COUNCIL BUSINESS

A. PH. A. COUNCIL LETTER NO. 3.

WASHINGTON, D. C., July 23, 1920.

To the Members of the Council:

8. *Comments on Mr. England's letter of June 2, 1920, relative to his ineligibility for service on the Committee on Publication* (*see Item 4, p.* 821).

Only abstracts are printed:

C. H. LaWall—"I am inclined to think that Mr. England's point is well taken so far as standing committees are concerned.

I should like to see the question argued and then voted upon anew."

L. E. Sayre—"I would suggest that the Council endeavor to make *it possible* to have Mr. J. W. England act *as he was elected*, as this was the expressed wish of the Association. The same remark applies to the other members mentioned in letter No. 2, pp. 6 and 7."

C. A. Dye—"The Council was created by the Association for a specific purpose, namely, to conduct the business of the Association during the year."

"It is extremely unfortunate that the membership of such an important committee as that on Publication should come so largely within the non-member class. * * * As a general principle it is not a wise thing to change such an important committee very materially at any time. On the other hand, as pointed out by Mr. England, we might find ourselves conducting the businesss of the Association largely through non-member committees."

" * * * Such an important committee as this, if it is to act in an advisory capacity to the Editor, should have more stability and not be subject to a change in its entirety each year, as it is likely to be under the present manner of appointment. It strikes me as being futile to expect a new man to be familiar with the details of publication and capable of offering any very constructive criticisms during his first year of service. Something then should be done to place the committee on a more stable basis."

* * * "It is to be regretted that the term of office of the three members on the Committee should terminate now, especially when the journal is trying out some new ideas and when it is trying to meet the demands of the members of the Association. * * * This is especially true of the services of Mr. England, since he has been so intimately connected with the JOURNAL for the past few years, and I trust some way may be found to have not only his, but also the services of the other members of the Committee retained."

"I am opposed to the appointment of non-members on committees of the Council as a general principle, that is, unless it should be done as above outlined. I would, on the other hand, be willing to have part of the retiring members appointed for the time being simply as a matter of expediency and so that the business of the JOURNAL might not suffer." * * *

R. A. Lyman—"I am interested in item No. 4. Mr. England is right. He is ineligible for service on the Committee on Publication as he is not a member of the Council. Messrs. Newcomb and Eddy are also ineligible for the same reason."

W. F. Rudd—"Referring to Council Letter No. 2, I think Mr. England's point is well taken. I have studied the constitution and by-laws and it seems to me the Publication Committee should come from members of the Council."

S. L. Hilton—"The position of Mr. J. W. England, as Chairman of the Committee on Publication, as set forth in Council letter No. 2, item No. 4, is well taken, the by-laws of the Council not having been amended as they should have been after the action of the Council with reference to the selection of non-members of the Council to committees. I, therefore, move that Mr. England's declination to serve as Chairman of the Committee on Publication be accepted, with regrets, and that the Council proceed to elect a chairman and at the same time fill the other two vacancies on

the Committee to which Mr. Clyde L. Eddy and Mr. E. L. Newcomb were elected, they likewise not being members of the Council."

In order to avoid any further delay in bringing this important matter before the members of the Council for a vote, your Secretary (A. G. DuMez) offers a second to Mr. Hilton's motion. * * *

A. G. DuMez,
Secretary.

A. PH. A. COUNCIL LETTER NO. 4.

Washington, D. C., Aug. 4, 1920.

To the Members of the Council:

9. *Election of members—result of vote.* Motion No. 6 (Applications Nos. 1 to 42, inclusive, for active membership) and motion No. 7 (Applications Nos. 1 to 11, inclusive, for soldier and sailor membership) have each received a majority of affirmative votes.

10. *Eligibility of non-members of the Council for service on standing committees of the Council (See Items 4 and 8). Result of vote.* Motion No. 8, a motion to accept Mr. England's declination to serve as Chairman of the Publication Committee because of ineligibility and to proceed to the election of a chairman and to fill the other two vacancies on this committee to which Messrs. Eddy and Newcomb were elected, they being likewise ineligible, has received a majority of affirmative votes.

As a result of this vote, the members of the Council are requested to place in nomination the names of the persons whom they desire to elect to fill these vacancies. Nominations for the chairmanship should be so designated as the by-laws require that the Chairman of the Publication Committee be elected by the Council.

11. *Election of active members.* You are requested to vote on the following applications for active membership:

No. 43, Harry Taub, 416 West 57th Street, New York, N. Y.; No. 44, Gerschen Cohen, 57 Jefferson Street, Paterson, N. J.; No. 45, Ralph Egbert Gray, P. O. Box 836, Lincoln, Nebr.; No. 46, C. William Kunzmann, 1246 O Street, Lincoln, Nebr.; No. 47, Walter Koehler, 138 W. Van Meter St., Kankakee, Ill.; No. 48, Alvin Conley Cox, Artesia, Miss.; No. 49, Leon Rambo, 305 N. Menard Ave., Chicago, Ill.; No. 50, Elias M. Rogoff, 1045 East 105th Street, Cleveland, Ohio; No. 51, Douglas R. Spiers, 2 West Main St., Middletown, N. J.; No. 52, Elmer M. Weidner, Birdsboro, Pa.; No. 53, William Arthur Isler, 324 South Queen Street, Kinston, N. C.; No. 54, Ryle Waldermar Danielson, Oakland, Nebr.; No. 55, Charles N. Koch, 5028 Parrish St., Philadelphia, Pa.; No. 56, Adam Samuel Dodd, West Memphis, Ark.; No. 57, Albert Richards, 301 East 161st Street, New York, N. Y.; No. 58, Hugh Clarke, 632 Bergen Line Ave., West New York, N. J.; No. 59, Lynas V. Carter, Stratford, Iowa; No. 60, Clarence C. Hazard, 220 West 2nd Street, Davenport, Iowa; No. 61, J. M. Spoonts, Megargel, Texas; No. 62, Abraham I. Goldberg, 313 Glenwood Ave., Bloomfield, N. J.; No. 63, Isaac Percy Sandman, 513 Ouachita Ave., Monroe, La.; No. 64, J. F. Whitley, Gilliam, La.; No. 65, James A. Patterson, 18th and Wabash Ave., Chicago, Ill.; No. 66, William Henry Darey, Jr., 101 S. Coit St., Florence, S. C.; No. 67, E. H. Gwinn, Victor, Iowa; No. 68, James J. Riemersma, Hospers, Iowa; No. 69, Seth A. Bergen, Essex, Iowa; No. 70, Marius Anderson, Dike, Iowa; No. 71, August C. Philipp, Manchester, Iowa; No. 72, Don S. Freiday, Cushing, Okla.; No. 73, S. L. Bickal, 1705 4th Ave., South, Fort Dodge, Iowa; No. 74, Harry R. Osterman, Little Rock, Iowa; No. 75, Dorothy Markels, 296 Franklin St., Springfield, Mass.; No. 76, Demetrios Christou Capetanakis, 727 Huntington Ave., Boston, Mass.; No. 77, Susan Russell Beetle, Fuller St., Edgartown, Mass.; No. 78, Jennie Elizabeth Thompson, 41 Granite St., Cambridge, Mass.; No. 79, Leslie Burns Barrett, 21 Rock St., Winsted, Conn.; No. 80, Vivian Francis Platt, Conway, S. C.; No. 81, Robert Kinlock Otis, 2031 Hampton St., Columbia, S. C.; No. 82, Frank M. Ellerbe, Jonesville, S. C.; No. 83, Elton John Braddock, U. S. Naval Station, Tutuila, Samoa.

12. *Election of soldier and sailor members.* You are requested to vote on the applications for soldier and sailor membership: No. 5, 12–15.

A. G. DuMez,
Secretary.

BIBLIOGRAPHY OF PHARMACEUTICAL RESEARCH

Conducted by H. V. Arny, Reporter on the Progress of Pharmacy, Chairman of the Committee on Research.

On these pages, each month, will be found a list of articles on pharmaceutical research that appear in the pharmaceutical and other scientific journals of the world. Whenever possible, the list appearing a certain month will record articles appearing in American journals of the preceding month and articles appearing in foreign journals will be recorded as quickly as possible after the journals reach the Reporter.

All articles appearing in these lists will be presented in abstract form in the bound volumes of the YEAR BOOK which will be issued as soon after the end of the year represented as editing and printing conditions permit. Those desiring abstracts immediately can obtain same for a fee of one dollar each by communicating with H. V. Arny, 115 West 68th St., New York, and arrangements can also be made for securing photographic reproduction of entire articles at moderate prices when such are desired.

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EDITORIAL NOTES

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UNIFORM PHARMACOPOEIAL TEXTS FOR COPAIBA, BALSAM OF PERU AND BALSAM OF TOLU.

Prof. L. Van Itallie has recently made an exhaustive study of the characters and tests of copaiba, Peru balsam and tolu balsam, and summarized the results of his observations, compared the texts of various pharmacopoeias with them, and formulated texts which he suggested should be included in the pharmacopoeias. These are printed in the *Chemist and Druggist* of August 14, p. 52. The following references relate only to new matter and wherein the U. S. P. differs.

Copaiba is designated a "balsam." The test for the presence of Gurjun balsam (U. S. P.) states "the acetic acid layer should not assume a *violet* coloration within half an hour." Also, "Copaiba should yield a clear mixture with an equal part of absolute alcohol, and also when mixed with an equal volume of petroleum ether; on mixing with two volumes of petroleum ether the resulting mixture should not be more than faintly cloudy."

Fatty oils and resin: "A mixture of three volumes of copaiba and one volume of ammonia should not be cloudy or milky (fatty oils), and should not gelatinize after standing for twenty-four hours (resin)."

The resin remaining after evaporation of the volatile oil should not be less than *45 percent.* The acid value, determined in the same manner as for fatty oils, should not be less than 75, nor more than 85; the saponification value should not differ by more than 14, compared with the figure for the acid value."

Balsam Tolu is the balsam "obtained from the wounded stem of *Myroxylon toluiferum,* H. B. and K., which has become entirely or partly solid by exposure to the air." It is described as "a yellow or reddish brown, soft or *crystalline* mass which softens when slightly warmed." "The solid can be reduced to a greyish brown powder. * * * The undissolved impurities should not exceed 3 percent." The saponification value is given, 160 to 120. Ash yield 0.5 percent. The residue left from a solution (1 Gm.) in carbon disulphide, on boiling with 2 or 3 mils of ammonia should yield a solution which even after standing for twelve hours is not transformed into a jelly (test for resin).

Balsam of Peru is "obtained from *Myroxylon Pereirae,* Klotzsch, by removing the bark of the trunk, and later alternately slightly scorching the exposed surfaces and making incisions.

"On warming on the water bath balsam of Peru should not yield an odor of turpentine, copaiba, or storax, and after half an hour should not show a loss of more than 2.5 percent.

"One part of balsam of Peru mixed with 1 or even 2 parts of alcohol should yield a clear mixture; on mixing with over 3 parts of alcohol a cloudy mixture results, which shows an acid reaction.

"One part of carbon disulphide and 3 parts of balsam of Peru yield a clear mixture (artificial balsam)."

Specific gravity 1.145–1.80. Saponification number not below 220. "If the liquid obtained in the determination of the saponification value of the cinnamein be evaporated, and a portion of the residue warmed with 5 Cc. of potassium permanganate solution (1:20), benzaldehyde is formed."

WHY PROPRIETARIES FLOURISH.

Dr. Cary Eggleston, of New York, sent a communication to the *Journal A. M. A.,* which is printed under above heading in the issue of August 21, p. 558. He had prescribed

Troches of Ammonium Chloride, U. S. P., for a patient, who endeavored to have the prescription filled, but was not successful in seven large pharmacies, when Dr. Eggleston persuaded a pharmacist of his acquaintance to prepare them. It is no wonder that he should be displeased, and he concludes his communication by saying that "real pharmacy by real pharmacists is a necessity. * * *" He takes occasion to say that it requires persuasion to have some pharmacists gelatin-coat pills; they endeavor to have precriptions changed to conform with stock formulas. He also makes references to experiences of two other physicians; one had prescribed an emulsion of cod liver oil, and the patient was informed this did not come without hypophosphites; another had prescribed Compound Laxative Pill, U. S. P. VIII, and the druggist inquired whether the Compound Cathartic Pill was wanted. While compelled to admit such occurrences, there is no reason why practitioners of medicine should not have the acquaintance of pharmacists who are desirous of filling prescriptions. We would have no trouble in referring to such both in New York and Boston—where the scenes of these transactions are laid. Prescription files will show that physicians are somewhat to blame for these conditions, but why criticize when coöperation will accomplish more?

THE NEW NORWEGIAN PHARMACOPOEIA.

The new Norwegian Pharmacopoeia follows the custom of most modern pharmacopoeias in using the language of the country in the text and Latin for official titles. The introductory pages are given to explanatory matter: methods of determining melting and boiling points; iodine, saponification, acid and ester indices are briefly described, and also percolation, sterilization, etc.; directions for collecting, drying, storing and comminuting of drugs are given. All medicines must meet pharmacopoeial requirements, and those for which an official method for preparation is given must be prepared in a pharmacy.

A weighable residue is designated as an amount exceeding 1 mg. Acid designations form the first part of official titles, and the arrangement being alphabetical, the chemicals are grouped accordingly—the bromides, iodides, sulphates, etc. The Latin nomenclature differs from other pharmacopoeias, thus—Brometum Kalicum, Chloretum Cocaicum, Sulfas Chinicus.

Forty-one preparations have been deleted from the previous Pharmacopoeia and eighty-five have been added. Some of the additions follow. "Aetheroleum" is the designation for essential oil; some of the essential oils have been replaced by the principal constituent; hypophosphites have been introduced; the spelling of "aqua" and "liquor" will be noted. Monographs on fluidextracts state the specific gravity, and percentage of dry extract yielded on evaporation. As an emulsifier a mixture of acacia (4), tragacanth (4) and gelatin (1) is employed in cod-liver oil emulsion.

ADDITIONS.

Acid. acetylsalicyl.
Acid. diaethylo-barbituric
Æther petrolei.
Æther pro narcosi.
Ætheroleum coriandri
Aqva sedativa
Bitartras suprarenicus
Chloroformium pro narcosi
Cinnamalum
Emulsio olei jecoris aselli
Eucalyptol
Eugenol
Extr. thymi fluidum
Liqvor formaldehydi saponatus
Novocain
Proteinum argenticum
Pulvis antiasthmaticus
Salicylas antipyricus
Salicylas hydrargyricus
Solutio chloreti natrici physiologica
Solutio subacetatis aluminici
Sulfas sparteicus
Syrup. hypophosphitis calcici
Syrup. hypophosphitum comp.
Vin. frangulae comp.

VETERINARY DOSE TABLE IN THE FINNISH PHARMACOPOEIA.

The fifth edition of the Finnish Pharmacopoeia, official since January 1915, contains a table of maximum single doses of drugs for full-grown horses, cattle, sheep, pigs and dogs.

MOTOR ALCOHOL FROM MOLASSES IN HAWAII.

From the lowly and sticky molasses is being produced "motor alcohol"—a substitute for gasoline. Discovered by J. P. Foster, chemist of one of the big sugar plantations on the Island of Maui, Hawaii, production within the next three months will be sufficient to furnish fuel for all cars on the islands should a gasoline shortage occur. According to the first reports of the new fuel brought to San Francisco "motor alcohol" gives more power, greater mileage, easier starting and more freedom from carbon than gasoline. It can be used without an adjustment of the carburetor.

The new fuel is performing in automobile, marine, stationary, truck and tractor engines. In a 36-hour test made with a 75-horse-power tractor the consumption of "motor alcohol" was four gallons an hour compared to four and a half gallons of gasoline in the same engine on the same work. Examination of the cylinders showed most of the old carbon deposit removed and the remainder so soft it could be removed with the fingers.

Sugar plantations have been letting their molasses run to waste or burning it for the potash recovery. Nitrogen and phosphoric acid are also valuable by-products of molasses. Now, however, production of the new fuel is found to be more profitable than obtaining other by-products.

At present there is enough molasses available to produce 9,000,000 gallons of "motor alcohol"—enough to supply all automobiles in Hawaii. Development of this industry will release shipping space formerly used for transporting gasoline from the United States.—*Scientific American.*

TECHNICAL TABLETS.

BY WILBUR L. SCOVILLE.

Far seeing.—Mr. Becke says that we see colors because the black pigment of the eye transforms the rays of light into heat, then the heat thus produced is perceived as light, and then color perceptions are brought about by the mental reaction to the absence of heat stimuli.

German chemists say that aldehydes of all kinds stimulate alcoholic fermentation.

Salt water for bacteria.—Sodium chloride tends to favor the growth of bacteria, but calcium chloride materially reduces it. The calcium salt is not thought to be toxic, but it reduces the permeability of the cell membrane and prevents the diffusion of catabolic products. Hence calcium chloride in water tends to act as an antiseptic.

The place for cresol.—Cresol does not act as effectively as a disinfectant in alkaline solutions on most bacteria, but with the coli bacillus it is efficient. Hence in alkaline solutions cresol is especially suitable for hospital use.

So iso!—Solutions for intravenous injection are now made isoviscous as well as isotonic. To make them isoviscous about 3 to 6 percent of acacia is dissolved in them. This adds a colloidal property also, which improves their effects by retarding osmosis and taking the place of lost blood.

Feels them coming.—When the epileptic seizure is coming on, the urine and blood show a remarkable increase in the content of ammonia. The approximate time of the fit can be foretold from this. It is thought that this indicates that epileptic fits are the results of an auto-intoxication by waste albuminous products, and this is the first toxic substance yet demonstrated as caused by psychosis.

Your nose knows.—"Odors are caused by the vibrations of electrons. The nasal sensory nerves have electron vibrations which are increased by resonance when odoriferous particles with corresponding intramolecular electron vibrations are drawn into the nose admixed with air. Metallic atoms readily detach electrons, hence are not suited for the production of odor." Is that catarrhal understanding?

Another fallacy exposed.—Utz says that when rapidly smoked, cigarettes containing 3 grains of opium each fail to show the slightest trace of morphine in the smoke. When very slowly smoked, a slight trace could be detected. Of nicotine, about one-third of that found in the tobacco could be found in the smoke.

A good excuse.—A French chemist thinks that since the enamel of the teeth is so sensitive to acids and bacterial corrosion, one of the main functions of the saliva is to protect and repair the enamel. Thus does science come to the support of the chewing gum habit.

Don't be a pessimist.—Depressive emotions and anxiety have been shown to increase the blood sugar and therefore to have an influence in diabetes. When diabetes is not shown, strong emotions produce hyperglycemia in marked degree. Be calm and don't waste your sugar.

Ice cream thrift.—H. A. Ruche claims that if ice cream manufacturers will invert the sugar before using it to make ice cream, a saving of 20 to 25 percent of the sugar will be effected. And a mixture of the invert sugar with glucose effects a further saving. To invert the sugar he simply boils 100 pounds of sugar in 45 pounds of water and 50 Gm. of tartaric acid for 30 to 35 minutes.

Oh, the cost!—In testing new motor fuels, mixtures of alcohol 1, ether 2 and gasoline 25 to 40 have been found to act much better than gasoline alone, and to remove carbon from the cylinders. Benzene also works well

in combination with small quantities of alcohol and ether, but if used too richly it causes deposits of frost on the carburetor. Benzene is increasing in production and promises to take a place in motor fuels.

No soda here.—An Italian chemist says that calomel is compatible with antipyrin in neutral or acid media, but is incompatible in alkaline media. In alkaline mixtures a compound is formed which is more toxic than calomel.

On the label.—Benzoic acid is found to inhibit the growth of the diphtheria bacillus in 0.04 percent solution, and is suggested as a germicide in wounds and internally for asthma, tuberculosis and rheumatism. Sodium benzoate is inert as an antiseptic.

PERSONAL AND NEWS ITEMS.

Few, perhaps, know that the scientist, Henry Cavendish, was a man of wealth—at the time of his death he owned $1,157,000 in different public funds, in addition to an income of $8,000 a year from his land and a bank balance of $50,000.

During the second week of August the city of Antwerp celebrated the 400th anniversary of the birth of Christopher Plantin, the founder of the printing house to whom we are indebted for the production of several of the most important herbals of the 16th century and for the illustrations of many more.

One hundred years ago (1820) Pelletier isolated quinine. The discovery of organic alkalis by Sertürner enabled Caventou and Pelletier to show that the cinchonine of Gomez, a Portuguese pharmacist, consisted of two distinct alkaloids which they named respectively quinine and cinchonine. Among the researchers of that and earlier periods may also be named Houton-Labillardiere, Fourquoy, Vauquelin and Berthollet.

Dr. Hermann Schelenz, honorary member of the American Pharmaceutical Association since 1912, was given the honorary degree of "doctor of medicine," July 22, by the University of Freiburg.

Dr. Armand Gautier, French chemist of note, died recently at Cannes, France, aged 83 years. His researches on ptomaines, discovered by him in 1873, and on alkaloids of bacterial origin, and his discovery of alkaloids from animal tissues, or leucomaines, won him a reputation in scientific medicine, and his experiments with organic compounds of arsenic led to the practice of subcutaneous injections of sodium cacodylate.

Gautier's most important works are his *Cours de chimie minérale et organique* (1895), *Les toxines microbiennes et animales* (1896), *Leçons de chimie biologique normale et pathologique* (1897), and *L'alimentation et les régimes chez l'homme sain et chez les malades* (1904).

M. H. Gautier, director of the Paris Superior School of Pharmacy, has been officially nominated "Dean of the Faculty of Pharmacy of the University of Paris."

M. Henri Martin, president of the General Association of French pharmacists, is a member of the French Committee of Anti-Venereal Prophylaxis.

A bronze bust of **Zacharie Roussin,** discoverer of certain aniline dyes, has been unveiled at the Rennes School of Medicine and Pharmacy (France), of which institution he was at one time a student, and M. Lenormand, professor of Analytical Chemistry and Toxicology at the school, who organized this commemorative ceremony, has been awarded the Cross of the Legion of Honor.

James Wilson, Secretary of Agriculture at the time of the enactment of the Pure Food and Drugs Act, died August 26, aged eighty-five years. He was Congressman for three terms, Secretary of Agriculture, U. S., for sixteen years; he served as regent of Iowa State University, and was also director of Iowa Experiment Station, and professor of Agriculture at the Iowa State Agricultural College.

Establishment in Panama of an International Institute for the Research of Tropical Diseases is proposed as a memorial to Major General **William C. Gorgas,** who died recently in London and whose most noteworthy health work was carried on in the Canal Zone.

Announcement was made in these columns of the July issue of the appointment of **Dr. Taylor Bogert** as a member of the Tariff Commission; since then, he has formally declined to accept the appointment.

Leo R. A. Suppan has been appointed associate professor of Pharmacy in the St. Louis College of Pharmacy and **Carl G. Hinrichs** associate professor of Chemistry in the same institution.

The *Lebanon Times* of August 18 devotes a column to castor bean cultivation in Lebanon County. Our veteran member, **Joseph L.**

Lemberger, gave this cultivation stimulus, and he has a number of full grown plants in the yard, back of his pharmacy.

Herbert Carl Raubenheimer, associated in business with his father, Otto Raubenheimer, was married to Miss Mildred Cole, of Lynbrook, Long Island, June 8th. The honeymoon trip was delayed until last month, and extended through Canada and New England.

Jeannot Hostmann, Recording Secretary of the House of Delegates, A. Ph. A., was the honor guest of Maryland Pharmaceutical Association.

A. G. Du Mez, Secretary of the Council A. Ph. A., addressed the Virginia Pharmaceutical Association, during the recent convention; the subject of his address was, "Is the Pharmacist of To-day Rendering to the Fullest Extent the Service for which He Is Fitted by Education and Training?"

Commodore Henry B. Gilpin, of Baltimore, was severely injured on August 2 when his automobile ran over an embankment and upset in trying to avoid another machine, in Frederick County, Maryland.

Henry P. Hynson, of Baltimore, left on July 15 for Seattle to be the guest there of his daughter, Mrs. John Bayless. He was accompanied by his daughter-in-law, Mrs. Henry P. Hynson, Jr., and granddaughter.

Simon Newton Jones, after fifty-two years of honorable service in the cause of pharmacy, has retired from the retail drug business. He has always taken an active part in all important matters affecting pharmacy, whether national, State or civic. He was one of the founders of the N. A. R. D., an honorary member of the Chicago Veteran Druggists' Association, and served as president of the Louisville Retail Druggists' Association for over twenty years. He has been an untiring worker for the Louisville College of Pharmacy, of which he is the president. Mr. Jones joined the American Pharmaceutical Association in 1870, hence, this is the 50th anniversary of his membership, and we take this opportunity of extending congratulations and best wishes.

OBITUARY.

PHILIP ASHER.

Dr. Philip Asher, one of the best known pharmaceutical educators in the South, died at Touro Infirmary, New Orleans, La., July 5th, after an illness of several months. Dr. Asher was a native of New York City. After his graduation from the New York College of Pharmacy in 1887 he went to New Orleans as chemist for a manufacturing firm. After his graduation as a physician from the Tulane University in 1895 he practiced medicine for a time. His preference, however, was for teaching, and in 1900 he was one of the founders of New Orleans College of Pharmacy, in which he was dean and professor of chemistry for 17 years. For several years before his death he had been interested in a commercial analytical laboratory. Dr. Asher early became affiliated with the American Pharmaceutical Association, was an enthusiastic attendant at its meetings and frequently contributed papers on pharmaceutical and related subjects. He was also a member of the American Chemical Society. He was the author of a work on "Chemistry and Toxicology for Nurses" and was a regular contributor to several periodicals on scientific subjects.

Dr. Asher was an enthusiastic teacher and much loved by his students. He made a practice of encouraging the ambitious student who was handicapped by poverty and many of his graduates feel that their success has been due largely to the inspiration received from their preceptor. In 1897 Dr. Asher married Miss Belle Picard, of New Orleans, who survives him.

E. G. MURPHY.

On May 30, death claimed E. G. Murphy, druggist, of East Las Vegas, New Mexico. He was born at Uniontown, Pa., August 16, 1857, and died at Saint Anthony's Sanitarium, East Las Vegas, following an operation for gallstones. In the death of Mr. Murphy, New Mexico has lost one of her leading citizens and her most prominent druggist. He had been engaged in the drug business in Las Vegas continuously for more than thirty years, was one of the organizers of the Board of Pharmacy, a member of it for more than thirty years, and president for many years. Mr. Murphy joined the American Pharmaceutical Association in 1909.

SOCIETIES AND COLLEGES

PHARMACEUTICAL EDUCATION AND CONFERENCE SCHOOLS.

BY WILBER J. TEETERS,

President of the American Conference of Pharmaceutical Faculties.

A rather interesting situation has arisen in connection with the Conference of Pharmaceutical Faculties.

The object of this Conference as stated in the Constitution is to promote the interests of Pharmaceutical Education.

During the evolution that has taken place in the twenty years of its existence two types of colleges have become distinctly recognized: the self-styled "old line" college and the college in connection with universities. The former are, as a rule, self-supported by tuition, while the latter are supported by the state.

The so-called "old line" colleges have, as a rule, been slow to advocate the raising of standards. The colleges of pharmacy in connection with the universities, on the other hand, have been active and persistent, not only for higher standards, but also that the colleges should be classified or standardized by some authorized agency, as the Carnegie Foundation or some similar organization willing to undertake the work.

Under these conditions it is not strange that educational progress has been slow.

Formidable clouds have arisen several times but by compromises the Conference has held together and it is fortunate that it has, for, at the present time, no one is willing to argue that a high school education should not be required as a basis for the study of pharmacy. The World War has definitely settled this point.

The Conference has standardized the Ph.G. degree and apparently by common consent has agreed that three years for the degree of Pharmaceutical Chemist and four years for the degree of Bachelor of Science in Pharmacy should be required. It is safe to say that all parties recognize the necessity and desirability of a thorough education in pharmacy. They know that professionally it is the only thing that will save pharmacy as a profession. They also know that educationally pharmacy has not advanced as rapidly as have medicine and dentistry; the reason is not hard to find—desire for students on the part of some of the colleges and the fear that higher requirements would lessen the number is the cause.

The membership in the Conference is upwards of fifty, out of a total number of colleges of approximately eighty, counting all kinds. It includes a few colleges of high rank whose entrance and graduation requirements have always been far above the minimum required by the Conference. It includes a number of mediocre grade, and some that merely come "under the wire," so to speak.

The Conference has set September, 1923, as the date when all institutions belonging to the Conference must require high school graduation for entrance. An investigation and standardization of the colleges will be secured within the next year if possible. It would seem safe to predict that in the adjustment, which must take place, eventually only institutions with an assured income, outside of tuition, can give courses that will meet present-day requirements in equipment and technical instruction and, last but not least, pay adequate salaries necessary to secure teachers of ability and experience.

PHARMACEUTICAL EDUCATION IN THE VOCATIONAL TRAINING PROGRAM OF THE ARMY.

Correspondence on the above-named subject between Wortley F. Rudd, then president of the American Conference of Pharmaceutical Faculties, and Hon. Newton D. Baker, Secretary of War, is printed in the July issue of this JOURNAL, p. 715. In another letter to the Secretary of War, under date of August 19, Professor Rudd quotes from the above cited communications, and writes further:

"I have given a good deal of thought to this statement of your position. As applied to ordinary vocational training, your position may be tenable. In my judgment, the fundamental error was made when those in charge of the educational program placed pharmacy in the 'vocational' group.

"The Army would not consider taking any steps that would change the educational status of Medicine or Dentistry. The practice of these professions is so hedged about by legislative enactment that any modification of the time requirement either for entrance into or graduation from the standard colleges

giving such professional training would inevitably work an injustice. For example, in my own state no one may take the State Board examination in Medicine who is not a graduate of what is technically known as a Class 'A' Medical School. Whether right or wrong, that is the law, and similar laws probably exist in other states. The assumption is that in formulating plans for both Premedical and Medical education, the American Medical Association and the Association of American Medical Colleges were the best qualified organizations to undertake the work. No matter how much knowledge of Medicine one may have, unless he acquired it according to a definite program that has been promulgated by those in a position to know best how it should be acquired, the applicant is refused examination.

"What I tried to say in my letter of April 22d was that if the Army's plan of teaching Pharmacy is not based upon the general plan laid down by the one National organization in a position to formulate correct policies, the Army men will later go into civilian life and be denied the privilege of examination because the Army plan was a law unto itself.

"I feel very sure that it is not the wish of the Army to work any such injustice. But unless there is a change injustice must result. Already in some states the law relative to the practice of Pharmacy stipulates that applicants for examination before the State Board shall be graduates of a school holding membership in or recognized by the American Conference of Pharmaceutical Faculties. If the Conference now requires a minimum of two years of High School work before matriculation, and has pledged itself to require four years by 1923, Army-trained pharmacists are not receiving what it was evidently planned to give them; *viz.*, an education equivalent to that required of civilian pharmacists.

"The writer's only apology for this rather frank expression of opinion is his earnest desire to see full coöperation among all the institutions, of whatever nature, that have taken it upon themselves to educate pharmacists.

"He believes this can be accomplished only by having the requirements of the American Conference of Pharmaceutical Faculties fully met by the Army as well as by civilian institutions engaged in Pharmaceutical instruction."

EDUCATIONAL OUTLOOK IN GREAT BRITAIN.

We are quoting part of an editorial of the *Chemist and Druggist* of August 21:

"Pharmaceutical education in Great Britain may now be said to have passed from the stage of indifference over the method of acquisition to one of acute interest on the part of the statutory authority. One effect of the war has been to accentuate the need of education in all departments of national life, and pharmacy has participated in the movement. Universities and technical colleges are awaking to the need of the equipment of their graduates and students with the necessary training to fulfil whatever function in life they choose. In pharmacy, at present, there is not that close coördination of the course of training which is fundamental to those desirous of a scientific or quasi-scientific career, as in pharmacy. The public expression of educational authorities shows clearly that our syllabus of studies has been wanting in the application of imagination in order to fit it into the scheme of things which every man of affairs with scientific training requires. Thus pharmacists repeatedly proclaim the lack of business knowledge, and men with the commercial instinct as the dominant factor never cease to tell us that this is our characteristic deficiency, that the curriculum leaves us on the threshold of science, and it is largely owing to that dangerous thing, 'a little knowledge,' we are bereft of our capacity, or at least diverted from the opportunity, of making a commercial success of our lives. Surely this is untrue. Pharmacy, even in its haphazard days, provided a mental training capable of equipping men for almost any sphere of action or thought for which they felt promptings. It was the haphazard way of entering pharmacy which was wrong, since temperamentally indifferent men drifted into the calling. Now that training is being systematized, it will undoubtedly provide a class of men and women equal to the best. The temperamentally unsuitable will not enter as in the past, but fight shy of the curriculum and knowledge of what they have to undertake. Training that is sound is bound to make the pharmacist of the future a man capable of viewing the problem of commerce with a breadth of vision infinitely superior and sounder than what passes as such in the hectic talk of these ruffled days of peace. * * *"

PHARMACEUTICAL SECTION IN FRENCH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

A pharmaceutical section was established at the last annual meeting (July) by the French Association for Advancement of Science. The section was organized by Professor Massol, director of the Montpellier School of Pharmacy.

UNIVERSITY OF WISCONSIN ESTABLISHES A COURSE IN PUBLIC HEALTH WORK.

The University of Wisconsin is providing for a course in public health work. It will be a five-year course, and students may enter it next fall. Although the new general hospital will not be completed and ready for practice work for two years, the first two years of the course are general college medical courses and the practice work does not come until the third year of the course.

In addition to this five-year course the University of Wisconsin now offers a three-year course, which fits the candidate for hospital duty, public health work and other branches of nursing. The candidate is offered a choice of six months' training in public health work or six months' training for institutional work in this shorter course.

VANDERBILT UNIVERSITY DISCONTINUES PHARMACY DEPARTMENT.

In announcing the discontinuance of the pharmacy department indefinitely the *Vanderbilt Alumnus* says editorially:

"The future of the school of pharmacy has been under consideration by the faculty for months past, and was further considered with unusual care by the board of trustees at its recent meeting. There were two propositions before the board. One involved distinct increase in requirements and a lengthening of the course to three or four years. The second proposition involved discontinuance of the school at the present time.

"Under present conditions the trustees decided that the old situation could not be longer maintained. The board of trustees, therefore, reluctantly decided to discontinue the school of pharmacy until state laws and other conditions make it possible for a professional course of high grade to be carried on with success."

Dr. E. A. Ruddiman, former dean, has accepted a position in the Research Department of Parke, Davis & Co.

THE NATIONAL ASSOCIATION OF RETAIL DRUGGISTS MEETS IN ST. LOUIS DURING THE WEEK OF SEPTEMBER 20.

In the August issue of THIS JOURNAL, p. 841, attention was called to the annual meeting of the National Association of Retail Druggists in St Louis, September 20–24. We take this opportunity of extending greetings and wishes for a successful meeting.

OFFICERS OF STATE PHARMACEUTICAL ASSOCIATIONS, 1920–1921.

(*Continued from p. 845, August issue.*)

(Secretaries of associations are asked to make corrections and send in list of officers, and name of next convention city.)

ALABAMA.

President, Lawrence C. Lewis, Tuskegee.
First Vice-President, S. H. Henderson, Talladega.
Second Vice-President, Roy Albright, Mobile.
Secretary, W. E. Bingham, Tuscaloosa.
Treasurer, S. L. Toomer, Auburn.
Mobile was selected as the place for holding the next meeting.

FLORIDA.

President, George R. Cherry, Jacksonville.
Vice-President, Max Hankins, Daytona.
Secretary-Treasurer, J. H. Haughton, Palatka.

MONTANA.

President, J. W. Seiden, Lewistown.
First Vice-President, J. N. Starbuck, Valier.
Second Vice-President, Charles Quist, Wisdom.
Secretary, J. Reidel, Boulder.
Treasurer, J. N. Talbot, Manhattan.
Helena was selected as the place for holding the next meeting.

NORTH DAKOTA

President, Homer Hill, Marion.
First Vice-President, John S. Miller, Rugby.
Second Vice-President, W. H. Itrich, Hebron.
Secretary, Roy G. Cook, Fargo.
Treasurer, W. S. Parker, Lisbon.

OHIO.

President, Frank Schwilk, Dayton.
First Vice-President, H. M. Highfield, Zanesville.

Second Vice-President, Thomas J. Evans, Newark.

Secretary, Theo. D. Wetterstroem, Cincinnati.

Treasurer, L. W. Funk, Columbus.

Cedar Point was selected as the place for the 1921 meeting.

OREGON.

President, E. A. Robinson, Portland.

First Vice-President, Claude Kem, Cottage Grove.

Second Vice-President, Lloyd Crocker, Portland.

Third Vice-President, George Sabin, Grant Pass.

Secretary, A. W. Allen, Portland.

Treasurer, B. F. Jones, Portland.

Portland was selected for the next meeting place.

SOUTH DAKOTA.

President, S. Solem, Kadoka.

Vice-President, Edward Hoffelt, Estelline.

Secretary, E. C. Bent, Dell Rapids.

Treasurer, A. A. Woodward, Aberdeen.

TENNESSEE.

President, B. B. Kern, Murfreesboro.

First Vice-President, J. E. Clark, Morristown.

Second Vice-President, O. J. Nance, Jackson.

Third Vice-President, J. B. Sands, Nashville.

Secretary, David J. Kuhn, Nashville.

Treasurer, T. H. Scruggs, Jackson.

Chattanooga was selected as the place for next year's meeting, third Tuesday in July.

VERMONT.

President, Harris W. Alexander, St. Albans.

First Vice-President, E. B. Hyde, Brandon.

Second Vice-President, A. O. Austin, Orleans.

Third Vice-President, C. N. Shaw, Bellows Falls.

Secretary, John B. Lambert, Burlington.

Treasurer, W. E. Terrill, Burlington.

VIRGINIA.

President, Jos. B. Clower, Woodstock.

First Vice-President, W. T. Reeves, South Boston.

Second Vice-President, J. E. Jackson, Tazewell.

Secretary, A. L. I. Winne, Richmond.

Treasurer, Miss Maud Lambert, Roanoke.

STATE OF WASHINGTON.

President, A. A. Tozer, Everett.

Secretary, A. W. Linton, Seattle.

Treasurer, Fred D. Marr, Tacoma.

District Governors, R. L. Hunt, Everett; G. C. Norton, Tacoma; P. H. Dirstine, Pullman; H. S. Elwood, Ellensburg; F. R. Robertson, Spokane.

Members of Executive Committee, C. Osseward, Seattle; G. E. Brown, Spokane.

A joint meeting with the Oregon Association is contemplated for next year.

WISCONSIN.

President, Bruno Leidel, Milwaukee.

First Vice-President, R. Buerstatte, Manitowoc.

Second Vice-President, E. H. Schultz, Neenah.

Third Vice-President, W. O. Gilbert, Melrose.

Secretary, E. H. Raeuber, Milwaukee.

Treasurer, Henry Rollman, Chilton.

Eau Claire was selected as the 1921 meeting place.

AMERICAN ASSOCIATION OF PHARMACEUTICAL CHEMISTS.

Officers for the ensuing year of the American Association of Pharmaceutical Chemists are: *President*, Harry Noonas, New York City; *First Vice-President*, G. D. Ellyson, Des Moines, Iowa; *Second Vice-President*, R. R. Patch, Boston, Mass.; *Secretary-Treasurer*, C. H. Searle, Chicago, Ill.

Boston was selected as the place of next meeting, which is to be held early in June, 1921.

CANADIAN PHARMACEUTICAL ASSOCIATION.

The eighth annual meeting of the Canadian Pharmaceutical Association was held in Montreal, August 16–19. A report submitted by H. H. Gates was adopted, recommending a two-year course of 1000 teaching hours for qualifying those who seek to practice pharmacy. A syllabus committee was appointed to prepare a reasonable and uniform curriculum in pharmacy for the schools of the several provinces.

J. E. Tremble, of Montreal, was elected President, and George E. Gibbard, of Toronto, Secretary.

The Pharmaceutical Association of the Province of Quebec elected the following officers: *President*, E. Vadboncoeur; *First Vice-President*, G. A. Lapointe; *Second Vice-President*, J. W. Elcombe; *Treasurer*, J. A. Goyer; *Secretary-Registrar*, H. J. Pilon.

PROPOSED DELETIONS FROM N. F. IV.

The National Formulary Revision Committee requests that the pharmacists of the country carefully look over the proposed deletions for the new National Formulary as published below. In case any of the preparations are being called for in your practice, notify Chairman W. L. Scoville, P. O. Box 488, Detroit, Mich.

Acetum Opii
Collodium Tiglii
Collodium Iodi
Collodium Iodoformi
Cordiale Rubi Fructus
Decoctum Sarsaparillae Compositum
Elixir Aurantii Amari
Elixir Bismuthi
Elixir Calcii Bromidi
Elixir Calcii Hypophosphitis
Elixir Calcii Lactophosphatis
Elixir Cinchonae Alkaloidorum, Ferri et Pepsini
Elixir Cinchonae Alkaloidorum, et Hypophosphitum
Elixir Cinchonae Alkaloidorum, Ferri et Bismuthi
Elixir Cinchonae Alkaloidorum, Ferri, Bismuthi et Strychninae
Elixir Cinchonae Alkaloidorum, Ferri et Calcii Lactophosphatis
Elixir Corydalis Compositum
Elixir Ferri Hypophosphitis
Elixir Ferri Lactatis
Elixir Formatum
Elixir Formatum Compositum
Elixir Humili
Elixir Hypophosphitum
Elixir Hypophosphitum et Ferri
Elixir Lithii Citratis
Elixir Pepsini et Ferri
Elixir Rubi Compositum
Elixir Salicylatus
Elixir Strychninae Valeratis
Elixir Viburni Prunifolii
Elixir Zinci Valeratis
Emulsum Olei Morrhuae cum Calcii Lactophosphate
Emulsum Olei Morrhuae cum Calcii Phosphate
Emulsum Olei Morrhuae cum Pruno Virginiana
Emulsum Olei Morrhuae cum Vitello
Emulsum Olei Ricini
Emulsum Petrolati
Fluidextractum Cinchonae Aquosum
Fluidextractum Coffeae
Fluidextractum Conii
Fluidextractum Corydalis
Fluidextractum Helianthemi
Fluidextractum Paracoto
Fluidextractum Petroselini Radicis
Fluidextractum Verbenae
Gelatinum Chondri
Glyceritum Vitelli
Glyceritum Guaiaci
Glyceritum Tragacanthae
Glycerogelatinum Acidi Salicylici
Glycerogelatinum Iodoformi
Glycerogelatinum Zinci Durum
Glycerogelatinum Zinci Molle
Gossypium Stypticum
Infusum Brayerae
Iodoformum Aromatisatum
Linimentum Ammonii Iodidi
Linimentum Tiglii
Linimentum Tiglii Compositum
Liquor Alumini Acetico Tartratis
Liquor Bismuthi
Liquor Bromi
Liquor Ferri Citratis
Liquor Ferri Hypophosphitis
Liquor Ferri Nitratis
Liquor Ferri Protochloridi
Liquor Ferri Oxysulphatis
Liquor Magnesii Sulphatis Effervescens
Liquor Pancreatini
Liquor Pepsini
Liquor Pepsini Aromaticus
Liquor Phosphori
Liquor Sodii Arsenatis, Pearson
Liquor Sodii Citro-Tartratis Effervescens
Liquor Strychninae Acetatis
Liquor Zinci et Alumini Compositus
Liquor Zinci et Ferri Compositus
Magma Ferri Hydroxidi
Massa Copaibae
Mistura Carminativa
Mistura Opii et Sassafras
Mistura Guaiaci
Mistura Olei Picis
Mistura Pectoralis, Stokes
Mulla Acidi Salicylici
Mulla Creosoti Salicylata
Mulla Hydrargyri Chloridi Corrosivi
Mulla Zinci
Oleatum Aconitinae
Oleatum Atropinae
Oleatum Cocainae
Oleatum Quininae
Oleatum Veratrinae
Petroxolins—Too many. Which can be spared?
Petroxolinum Betanaphtholis

Petroxolinum Cadinum
Petroxolinum Chloroformi Camphoratum
Petroxolinum Creosoti
Petroxolinum Eucalyptolis
Petroxolinum Guaiacolis
Petroxolinum Hydrargyri
Petroxolinum Iodi
Petroxolinum Iodi Dilutum
Petroxolinum Iodoformi
Petroxolinum Liquidum
Petroxolinum Mentholis
Petroxolinum Methylis Salicylatis
Petroxolinum Phenolis
Petroxolinum Phenolis Camphoratum
Petroxolinum Picis
Petroxolinum Spissum
Petroxolinum Sulphuratum
Petroxolinum Sulphuratum Compositum
Petroxolinum Terebinthinae Laricis
Phenol Iodatum
Pilulae Antimonii Compositae
Pilulae Antidyspepticae
Pilulae Colocynthidis Compositae
Pilulae Colocynthidis et Hyoscyami
Pilulae Colocynthidis et Posophylli
Pilulae Ferri, Quininae, Strychninae et Arseni Fortiores
Pilulae Glycerylis Nitratis
Potassa cum Calce
Pulvis Gambir Compositus
Pulvis Kino et Opii Compositus
Sal. Lithii Citratis Effervescens Compositum
Sal. Potasii Bromidi Effervescens Compositum
Sal. Vichyanum Factitium Effervescens cum Lithio
Soda cum Calce
Sodii Boro-Benzoas
Succus Citri et Pepsinum
Syrupus Althaeae
Syrupus Calcii Hydrochlorophosphatis
Syrupus Calcii Hypophosphitis
Syrupus Calcii Iodidi
Syrupus Calcii Lactophosphatis et Ferri
Syrupus Ferri et Mangani Iodidi
Syrupus Ferri Hypophosphitis
Syrupus Ferri Lactophatis
Syrupus Ferri Protochloridi
Syrupus Morphinae et Acaciae
Syrupus Sodii Hypophosphitis
Syrupus Stillingiae Compositus
Syrupus Cimicifugae Compositus
Syrupus Codeinae
Tinctura Amara
Tinctura Aromatica
Tinctura Caramellis
Tinctura Ergota Ammoniata
Tinctura Iodi Decolorata
Tinctura Kino et Opii Composita
Tinctura Paracoto
Tinctura Pectoralis
Tinctura Rhei et Gentinae
Tinctura Zedoariae Amara
Trochisci Carbonis Ligni
Trochisci Gambir
Trochisci Menthae Piperitae
Unguentum Picis Compositum
Unguentum Plumbi Iodidi
Unguentum Veratrinae
Unguentum Zinci Stearatis
Vinum Aurantis Compositum
Vinum Carnis
Vinum Carnis et Ferri
Vinum Ferri
Vinum Fraxini
Vinum Pepsini
Vinum Picis
Vinum Pruni Virginianae
Vinum Pruni Virginianae Ferratum
Vinum Rhei Compositum

FOR ADDITION

Compound Digestive Elixir—modified
Compound Mustard Ointment
Compound Capsicum Ointment
Compound Syrup of Thyme
Suspension (or Emulsion) of Benzyl Benzoate
Ampoules

THE PHARMACIST AND THE LAW.

COURT IN RESTRICTING PRICE CONTROL ACTS TO ENCOURAGE TRADE COMPETITION.

Manuel Wast, LL.B., writes on the above subject in the *Philadelphia Public Ledger* of August 28th:—

The United States Supreme Court has settled definitely and finally the question of the right of a manufacturer to control resale prices of his products. In the light of various recent decisions of the court named, the question was honeycombed with doubts and difficulties that were as insoluble to the lawyer as they were bewildering to the business man. Now the court has squarely faced the issue, and its pronouncement points out clearly the paths of legality and illegality in the matter of price-fixing by manufacturers in their dealings both with jobbers and consumers.

The case in which the issue has been disposed of takes up the prior decisions of the court on this subject, and in connection with them lays down the following fundamental principles:

First. A manufacturer of an article cannot control its resale price by a notice printed on the article or on its container prohibiting resale except at a fixed price. That is to say, such a printed notice has no legal effect. It does not violate any law, so as to render the manufacturer liable to civil or criminal proceedings, but it may be ignored with impunity by jobber, retailer and ultimate consumer.

ILLEGAL AGREEMENTS OUTLINED.

Second. Agreements exacted by the manufacturer from jobbers or from retailers for the purpose of binding the latter to sell the article at a price fixed by the former are illegal in every sense. They cannot be enforced by resort to the courts, and they render the manufacturer liable for damages in civil proceedings and to fine and imprisonment in criminal proceedings.

The contracts now in contemplation are those which are part of a general plan to restrict all sales to jobbers and dealers who definitely agree to observe the dictates of the manufacturer as to resale prices. Violation of these agreements is usually expressed to be penalized by cancellation of the contract and a refusal to make further deliveries to the defaulting party.

Third. No violation of law is involved, although the purpose in view and the result attained are the fixing of resale prices, where the manufacturer simply indicates his wishes as to resale prices, without exacting contracts from the jobbers and retailers; and this practice is not rendered illegal even if the manufacturer refuses further dealings with any jobber or dealer who ignores his wishes as to resale prices.

It must be admitted that the lines between the cases that come under the two latter of the above propositions are finely drawn, but the court is specific in its insistence on the fundamental differences underlying this classification. The court's final conclusion on this point is thus expressed:

"It seems unnecessary to dwell upon the obvious difference between the situation presented when a manufacturer merely indicates his wishes concerning prices and declines further dealings with all who fail to observe them, and one where he enters into agreements —whether expressed or implied from a course of dealing or other circumstances—with all customers throughout the different states, which undertake to bind them to observe fixed resale prices. In the first, the manufacturer but exercises his independent discretion concerning his customers, and there is no contract or combination which imposes any limitation on the purchaser. In the second, the parties are combined through agreements designed to take away dealers' control of their own affairs, and thereby destroy competition and restrain the free and natural flow of trade among the states."

Three of the nine justices of the court dissent from this reasoning, but in accordance with the established policy of the court, the decision is wholly binding in all future cases coming within its scope. Only legislation by Congress can change the rules thus announced.

It should be pointed out that the rules here dealt with apply only to transactions involving interstate commerce and to commerce between a state and a territory which, like the District of Columbia or the Philippine Islands, is controlled by the federal government. If the sale of a product is limited to the confines of a particular state, local statutes and court decisions must be resorted to for the determination of the legality of price-fixing practices.

PROPOSED INDUSTRIAL ALCOHOL REGULATIONS.

The following is a reprint of portions of an editorial in the *Paint, Oil and Drug Reporter* of August 30th:—

It has been learned from an authoritative source that Commissioner Williams of the Bureau will recommend to Congress at its next session that the task of enforcing the industrial alcohol regulations be divorced completely from the present prohibition unit of the Bureau, and that a special regulative body, to be known as the Industrial Alcohol Commission, be created to administer the alcohol sections of the Volstead law.

Commissioner Williams' recommendations are based on equity and justice. The conditions surrounding the use of alcohol for legitimate manufacturing purposes have grown so acute that some step looking to the relief of bona fide consumers has become an absolute necessity. The hampering restrictions under which honest consumers are being forced

to do business at the present time are demoralizing industry. Legitimate users of alcohol have long chafed under the clauses in the regulations which make it difficult for them to procure the necessary supplies of spirits to keep their plants in operation.

The changes as suggested in the administrative functions of the Internal Revenue Bureau should receive the indorsement of all legitimate users of alcohol. Congress should by every fair means be prevailed upon to consider the recommendations at the short session, to the end that legitimate industry may be enabled to expand freely.

While on the subject of alcohol regulations, mention must be made of the unjust taxing of alcohol intended for use in certain products. The levying of a tax on consumers of industrial alcohol is absolutely against the provisions of the Volstead Act. Though it is prescribed in the prohibition regulations, the tax is not in conformity with the law itself. A manufacturer of shellac, under the existing regulations, can procure his alcohol free of tax; a manufacturer of hair tonics, on the other hand, who assuredly is a legitimate consumer of alcohol, is required to pay a tax on the alcohol he buys. The unjust discrimination should not be permitted to continue. Why a tax at all on alcohol intended for legitimate industrial use?

MARYLAND PREREQUISITE LAW.

The Maryland "prerequisite" law requires that each candidate for registration as a pharmacist shall be twenty-one years of age, have had four years of high school training and four years of drug-store experience, and be a graduate of a college of pharmacy "recognized" by the board. Candidates for registration as assistants must be eighteen years old, have had two years of high school training, two years of drug-store experience, and have attended one term at a college of pharmacy.

BOOK NOTICES AND REVIEWS.

Reagent Chemicals, Standards and Tests for. By B. L. Murray. Published by D. Van Nostrand Co., New York. 379 pp., with index. Price, $3.00.

A great improvement over Krauch. A well-selected list of the principal inorganic and organic reagents. Under each reagent chemical is given its chemical formula and molecular weight, followed by a clear, concise description of its physical and chemical characteristics, methods of preservation, uses in chemistry and the arts, etc. Many valuable suggestions and useful bits of information are given in conjunction with frequent references to literature. This portion of the text makes the book a source of much useful information for the analytic or research chemist. Next in order follows a tabular arrangement of "Maximum Limits of Impurities," in which the author has endeavored to set approximate limits of unavoidable impurities, to which we will refer again. This is followed by "Methods of Testing" given concisely and obviously intended for the experienced chemist. Introducing the text is a short caption entitled, "Explanatory Notes," which cover specific gravity, solubilities, boiling and melting points, etc. We regret to note that the author has retained the old unit of 15° C. for specific gravities. This seems unfortunate in view of the U. S. P. standard of 25° C., and the Bureau of Standards of 20° C. The wisdom of the 25° C. standard of the U. S. P. has been amply demonstrated to the satisfaction of all. Two pages are devoted to "Reagents, Tests and Test Solutions." We note the absence of any reference to the U. S. P. reagents, which comply with those of the Bureau of Standards and Department of Agriculture. I note this because we desire, above all, uniformity. Reference to the U. S. P. text for the preparation of reagents would leave nothing to be inferred, since it is very clear and explicit.

The author's methods of preparation of his reagents are too concise, leaving much to the idiosyncrasies of the chemist. While this may not influence some reagents, yet it is of great importance with the majority.

"Marsh Test for Arsenic." This test has undergone many modifications, each of which requires strict adherence to minute details if reliable results are to be expected. The text description of the apparatus as well as the manner for carrying out the text is too general and loose. No precautions are given. This is unfortunate, owing to the frequent references to the test in quantitative arsenic determinations. It would have added to the value of the book to have included the U. S. P. modified Gutzeit, which is simpler, more rapid in execution and equally accurate.

Also the preparatory precaution of *previous* reduction of the "ic" to "ous" arsenic is provided for. It is not wise to depend in all cases upon the nascent hydrogen of the old Marsh apparatus to reduce all of the arsenic. The test for arsenic under bismuth subnitrate needs revision. Suggest boiling with sodium hydroxide for removal of the arsenic from the bismuth and then testing this. Under metaphosphoric acid, the statement "no dark color should develop" after testing according to Bettendorff is taken to indicate not over 0.0015 percent of arsenic. In this instance some degree of color intensity should be given for comparative purposes. That is, through the employment of other chemicals in definite dilutions.

"Maximum Limits of Impurities." The plan of stating on the labels of reagents the quantities of impurities present has been in use for some years. No one has attempted to establish standard limits in such a systematic manner up to the appearance of this work, aside from sporadic attempts of the U. S. P. This plan is an excellent one; a responsible task requiring much experience and careful accurate work for which Mr. Murray is eminently fitted. In performing this task, the author realizes fully its difficulties in his preface statement, *viz.*, "The percentage figures in which the limits are stated were in part determined by quantitative tests, and to this extent are accurate; in part by qualitative tests in which the reactions in unknowns are compared with knowns. Such comparative tests....should not be regarded as exact." The analyst is not so much concerned over limits as he is over the accuracy of the analyses as stated on the label of the reagent he is using in important investigations.

So long as the quantities of the more important impurities are accurately given on a label, he can make the necessary corrections, otherwise the reagent is worthless except in so far as he is informed what impurities he may expect.

For general analytic work the qualitative limit tests are the best and most satisfactory, but cannot be relied upon in accurate quantitative determinations.

We note that the limit of ammonia salt in molybdic anhydride is set at 0.0035%, and determined by boiling 1 Gm. of the anhydride with alkali and noting that moist red litmus is not turned blue. This is a loose and inaccurate quantitative method owing to the great variability in the quality of red litmus paper.

Market red-litmus may respond to N/1000 alkali V. S. or only to N/10 alkali V. S. The author should have established standards of sensitiveness for both blue and red litmus. In this connection I would suggest that Azolitmin should be tested rather with 0.5 Cc. of N/100 HCl or NaOH V. S. than 0.05 Cc. of N/10 V. S.

The author's method for determining definite percentage limits of Ca-Mg-SO_4 and other like ions through the absence of any noticeable reaction following the addition of a reagent to a percentage solution of the reagent is open to criticism. If any degree of accuracy is desired a proper large quantity of the reagent should be taken and the customary methods of analysis followed.

Some frequently occurring expressions are noted, *viz.:* "The reagent contains not less than," suggest following the U. S. P. plan stating, "The reagent *should* contain...." In the rubric under molybdic acid the statement, "It contains at least 83 percent and usually about 85 percent of MoO_3" might lead the unsuspecting to assume that *all* molybdic acids are up to this standard. The insertion of "should" would clarify the statement. In testing for absence of Cl by means of silver nitrate, the statement, "The liquid should not appear changed" seems too vague. Again, in adding this reagent to the solution being tested it is directed, for example, to "add *some* silver nitrate solution,"—it would be better to replace "some" by "a few drops." The terms "faint and slight opalescence" as well as "opalescence," occur frequently and are used to indicate widely varying quantities of Cl ions under the same term and conditions.

Why not adopt standard dilutions for comparison so that such terms as faint or slight or simple opalescence may be interpreted alike by all?

It is refreshing to note the use of the word *determining* in place of the old term estimating.

Under nitric acid, arsenic determination, the expression "evaporate the mixture on a sand-bath to fumes of sulphur dioxide" should read "until fumes of sulphur dioxide appear." Under sodium thiosulphate we miss tests for sulphites, sulphate and free sulphur.

Space does not permit reference to other slight slips appearing in the text which are unavoidable in editing a work of this character.

The press-work is unusually well done; the clear, bold type with the systematic arrangement of the text affords the reader a quick comprehensive grasp of the text.

Mr. Murray is to be congratulated on offering us a valuable reference book, the editing of which has required much care and experience. V. COBLENTZ.

Practical Standardization by Chemical Assay of Organic Drugs and Galenicals. A manual for the student of pharmacy and a convenient hand-book of Pharmaceutical Assaying and Standardization for the practical pharmacist, the manufacturer, the control chemist or the drug inspector, by A. B. Lyons, F.C.S. Published by Nelson Baker & Co., Detroit, Mich. Price, $3.00.

The Foreword defines standardization, and states that this implies the possibility of a reasonably exact determination of the active constituent or constituents of drugs. Trustworthy assay processes, therefore, are the one solid foundation on which to build. That the results of such assay shall be minutely exact is not essential, but the results must not be of doubtful interpretation. It sometimes happens that no assay has been found which is in itself infallible, but that we have two processes mutually confirmative, by which practical certainty of our results may be reached.

"In preparing this brochure reasonable completeness has been the aim kept in view, but in this age of rapid progress in science and in the practical application of scientific discoveries, completeness is an idea that may be approximated, perhaps, but never fully attained."

The author is nearing his four-score years and the undertaking of preparing this publication was an arduous task. He has accomplished the work with the care that has marked his contributions to the U. S. Pharmacopoeia and to pharmaceutical literature during many years. He gives due credit to the collaborators and the experience gained in the laboratory.

Part I is devoted to "General Principles and Procedures," including preliminary operations in the assay of crude drugs, methods of exhaustion, extraction of alkaloids by means of immiscible solvents, volumetric determination of alkaloids by alkalimetry. Then follow alternative procedures, routine procedures for assay of crude drugs, and for assay of galenical preparations. General principles for the assay of volatile oils are also given and methods for the determination of saponification values, and iodine absorption value of fixed oils and fats.

Part II is concerned with detail of assay methods and standardization of individual drugs. There are ten chapters and the subjects considered are: Liquids employed as solvents, alkaloidal drugs, potent non-alkaloidal drugs, cathartic drugs, non-potent vegetable drugs, essential oils, epinephrine and glandular extracts, organic principles and synthetics, carbohydrates, and digestive enzymes. There are also various tables, lists of apparatus, reagents, etc.

The paragraphs of subjects are numbered for convenient reference, and the book has nearly 400 pages. The author deserves credit for presenting a valuable work for the student and practical pharmacist. The only adverse criticism we have to offer is relative to typography, and greater care should have been given to the final proof reading. The book deserves to be in the laboratory of every pharmacy, and, in the laboratory, will serve students and workers as an authoritative guide.

PUBLICATIONS RECEIVED.

Annual Reports of the Chemical Laboratory of the American Medical Association, Volume 12, January to December, 1919. Part I, Reprint of Contributions, Part II, Reports abstracted from the JOURNAL, Part III, Reports not previously published. Laboratory Staff: W. A. Puckner, Phar.D., director, Secretary of Council on Pharmacy and Chemistry, A.M.A.; P. N. Leech, Ph.D.; A. H. Clark, Ph.G., B.S.; L. E. Warren, Ph.C., B.S.

"This volume contains accounts of those portions of the A. M. A. Laboratory's activities which are of interest to workers concerned with the examination and standardization of medicines." Special attention is called in the Preface to the reports contained therein on the American-made synthetic drugs: barbital and barbital sodium, veronal and veronal sodium, luminal and luminal sodium, and phenetidyl-acetphenetidin hydrochloride, also to the examination of acriflavine and proflavine which received considerable attention during the war in the treatment of wounds. These reports have value for the pharmacist on account of the information relative to drugs, and methods of analysis which are employed.

The Supplement to the United States Naval Medical Bulletin—Published for the information of the Hospital Corps of the Navy. Issued by the Bureau of Medicine and Surgery Navy Department, Division of Publications, Captain J. S. Taylor, Medical Corps, United States Navy, in Charge. Edited by Lieutenant Commander H. H. Lane, Medical Corps, United States Navy, July, 1920. Copies may be had by sending 25 cents in money (not stamps) to the Superintendent of Documents, Government Printing Office, Washington, D. C.

As usual, the *Supplement* contains instructive and interesting matter. The address by Lieutenant P. F. Dickens, delivered at the Washington meeting of the American Pharmaceutical Association on "The Pharmacist in the Navy," presents the subject interestingly, and the "Syllabus of the Hospital Corps Training School, Naval Training Station, San Francisco, indicates the line of work and study which the students pursue. This number contains 172 pages and quite a number of excellent half-tone illustrations.

The Lilly Scientific Bulletin, Series 1, No. 10. This number contains "A contribution to the Pharmacology of Cotton Root Bark," by Charles R. Eckler, M.S.; "The Specificity of Disinfectants and Its Bearing on their Standardization," by A. L. Walters, B.S., M.D., and "The Preparation of 1,2-Dichloro-Ether," by E. A. Wildman and Harold Gray.

Hygienic Laboratory—Bulletin No. 120. February, 1920. I. The Experimental Production of Pellagra in Human Subjects by Means of Diet, by Joseph Goldberger and G. A. Wheeler. II. The Chemical Composition of the Rankin Farm Pellagra Producing Experimental Diet, by M. X. Sullivan and K. K. Jones. III. Biological Study of a Diet Resembling the Rankin Farm Diet, by M. X. Sullivan. IV. Feeding Experiments with the Rankin Farm Pellagra Producing Experimental Diet, by M. X. Sullivan.

How to Pass the Board: "A text book for preparing students to pass the examinations of any State Board of Pharmacy," By D. Chas. O'Connor, author of "Commercial Pharmacy," etc. 435 pages, $8\frac{1}{2} \times 5\frac{1}{2}$. Bound in cloth. Price, $3.50. The Spatula Publishing Company, Boston.

NEW PUBLICATIONS.

The Microscope. Re-Written and largely Re-Illustrated. Simon Henry Gage, of Cornell University. Price, $3.00. Comstock Publishing Co., Ithaca, N. Y.

Applied Economic Botany. Melville Thurston Cook, Ph.D., Rutgers College, New Brunswick, N. J. The author has endeavored to make this work so flexible that it may be used in schools regardless of the amount of time devoted to the subject, of the available laboratory space and equipment. 261 pp. J. B. Lippincott Company, Philadelphia.

Pasteur—The History of a Mind. Emile Duclaux. Translated by Erwin F. Smith and Florence Hedges, Pathologists of the U. S. Department of Agriculture. This book is not only a critique of Pasteur. It is a contribution to biological history at a very important period in the development of science. 363 pp. The W. B. Saunders Co., Philadelphia.

Pharmacology. Douglas Cow, M.D. $7\frac{1}{4} \times 4\frac{3}{4}$ in. Pp. 132. 7s. 6d. J. & A. Churchill, 7 Great Marlborough Street, London, W. [This is the first volume of the "Students' Synopsis Series" of books which Messrs. Churchill have in hand. Dr. Cow states that the book is not intended to displace any of the recognized textbooks, but to be used along with them. It is adapted for the final reading as a refresher of the student's memory before the examination. The book is arranged in paragraphs alphabetically, and deals not only with single drugs, but with classes of remedies and the action of drugs upon parts of the body.]

Experimental Organic Chemistry. Augustus P. West. Illustrated. 469 pp. Price, $3.00. World Book Co., Yonkers on Hudson, N. Y.

Acids, Alkalies and Salts. G. H. J. Adlam. 8vo. 121 pp. Price, 2s. 6d. Sir Isaac Pitman & Sons, New York.

Chemical Dictionary: Inorganic Chemical Synonyms and Other Useful Chemical Data. E. R. Darling. 12mo. 100 pp. Price, $1.00. D. Van Nostrand Co., New York.

Kinetic Theory of Gases and Liquids. R. D. Kleeman. 12mo. 272 pp. Price, $3.00. John Wiley & Sons, Inc., New York.

A Short Handbook of Oil Analysis. A. H. Gill. 9th Ed. Revised. 215 pp. Price, $2.50. J. B. Lippincott Co., Philadelphia.

Food Inspection and Analysis. A. E. Leach and A. L. Winton. 4th Ed. Revised and enlarged. 1,090 pp. Price, $8.50. John Wiley & Sons, Inc., New York.

Everyday Chemistry. Alfred Vivian. 12mo. 560 pp. Price, $1.64. American Book Co., New York.